NATIONAL DEFENSE RESEARCH INSTITUTE

THE ARTS
CHILD POLICY
CIVIL JUSTICE
EDUCATION
ENERGY AND ENVIRONMENT
HEALTH AND HEALTH CARE
INTERNATIONAL AFFAIRS
NATIONAL SECURITY
POPULATION AND AGING
PUBLIC SAFETY
SCIENCE AND TECHNOLOGY
SUBSTANCE ABUSE
TERRORISM AND HOMELAND SECURITY
TRANSPORTATION AND INFRASTRUCTURE
WORKFORCE AND WORKPLACE

This PDF document was made available from www.rand.org as a public service of the RAND Corporation.

Jump down to document

The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world.

Support RAND

Purchase this document
Browse Books & Publications
Make a charitable contribution

For More Information

Visit RAND at www.rand.org
Explore the RAND National Defense Research Institute
View document details

Limited Electronic Distribution Rights

This document and trademark(s) contained herein are protected by law as indicated in a notice appearing later in this work. This electronic representation of RAND intellectual property is provided for non-commercial use only. Unauthorized posting of RAND PDFs to a non-RAND Web site is prohibited. RAND PDFs are protected under copyright law. Permission is required from RAND to reproduce, or reuse in another form, any of our research documents for commercial use. For information on reprint and linking permissions, please see RAND Permissions.

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
2010		**00-00-2010 to 00-00-2010**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Measuring Underemployment Among Military Spouses	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Rand Corporation,1776 Main Street,PO Box 2138,Santa Monica,CA,90407-2138**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**111**	

This product is part of the RAND Corporation monograph series. RAND monographs present major research findings that address the challenges facing the public and private sectors. All RAND monographs undergo rigorous peer review to ensure high standards for research quality and objectivity.

Measuring Underemployment Among Military Spouses

Nelson Lim, David Schulker

Prepared for the Office of the Secretary of Defense

Approved for public release; distribution unlimited

NATIONAL DEFENSE RESEARCH INSTITUTE

The research described in this report was prepared for the Office of the Secretary of Defense (OSD). The research was conducted in the RAND National Defense Research Institute, a federally funded research and development center sponsored by OSD, the Joint Staff, the Unified Combatant Commands, the Department of the Navy, the Marine Corps, the defense agencies, and the defense Intelligence Community under Contract W74V8H-06-C-0002.

Library of Congress Cataloging-in-Publication Data is available for this publication.

ISBN 978-0-8330-4884-4

The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

RAND® is a registered trademark.

© Copyright 2010 RAND Corporation

Permission is given to duplicate this document for personal use only, as long as it is unaltered and complete. Copies may not be duplicated for commercial purposes. Unauthorized posting of RAND documents to a non-RAND Web site is prohibited. RAND documents are protected under copyright law. For information on reprint and linking permissions, please visit the RAND permissions page (http://www.rand.org/publications/permissions.html).

Published 2010 by the RAND Corporation
1776 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
4570 Fifth Avenue, Suite 600, Pittsburgh, PA 15213-2665
RAND URL: http://www.rand.org
To order RAND documents or to obtain additional information, contact
Distribution Services: Telephone: (310) 451-7002;
Fax: (310) 451-6915; Email: order@rand.org

Preface

The military lifestyle can be very demanding, not just for military members themselves but also for their families. The U.S. Department of Defense (DoD), to promote member retention and as part of its self-imposed duty to care for military families to the utmost extent, seeks to monitor and improve employment opportunities for military spouses.

As a continuation of its previous work on employment opportunities for military spouses, the RAND Corporation was asked to examine available data and to report on the extent and causes of underemployment. This document presents our research and findings on underemployment among military spouses.

This research was sponsored by the Military Community and Family Policy Office in the Office of the Secretary of Defense and conducted within the Forces and Resources Policy Center of the RAND National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the Unified Combatant Commands, the Department of the Navy, the Marine Corps, the defense agencies, and the defense Intelligence Community. Comments are welcome and may be sent to Nelson Lim at Nelson_Lim@rand.org.

For more information on RAND's Forces and Resources Policy Center, contact the Director, James Hosek. He can be reached by email at James_Hosek@rand.org; by phone at 310-393-0411, extension 7183; or by mail at the RAND Corporation, 1776 Main Street, Santa Monica, CA 90407-2138. More information about RAND is available at www.rand.org.

Contents

Figures

Tables

Summary

One of the many aspects of military family quality of life that DoD seeks to monitor and improve is the degree of employment opportunity available to spouses of military members (whom we refer to as *military spouses*). In advising DoD on how best to measure underemployment among military spouses, we argued in previous work (Lim and Golinelli, 2006) that the Labor Utilization Framework (LUF) is superior to traditional Bureau of Labor Statistics (BLS) measures of underemployment, such as the unemployment rate. In that work, we also proposed a set of additional survey questions that would provide enough information to construct the LUF measures of underemployment.

In response to that research, in 2006 DoD implemented enough survey questions to allow for the construction of some LUF measures (in particular, the measures of labor force position at a given point in time). Thus, this report builds on previous work and applies the LUF measures of labor force position to 2006 data on military wives.

Applying the LUF Labor Force Position Categories to Military Spouse Employment

The LUF groups people into eight different labor force position categories. These categories are analogous to such BLS categories as "not in the labor force" (NILF), "unemployed," etc., except that the LUF categories are more specific. Among people who are not looking for work (NILF according to the BLS), the LUF differentiates between those who do not look because they are not interested in working,

and those who do not look because they are discouraged about their continuous lack of opportunity (subunemployed). "Unemployed" in the LUF is equivalent to the traditional BLS definition—actively looking for work and jobless. With part-time employees, the LUF distinguishes between those who want part-time employment (voluntarily part-time employed) and those who work part-time because full-time work is unavailable (involuntarily part-time employed). Finally, the LUF groups full-time employees into three categories: those who are underemployed because of low income, those who have relatively high levels of education for their jobs (indicating a possible mismatch), and those who are adequately full-time employed.

As a technical side note, we borrow the term "underemployed" from the LUF literature as a sort of shorthand to refer to those who are not in the "adequately full-time employed" category. We do not mean to imply anything about what their employment level should be. For example, we describe those who are NILF as underemployed, but we do not intend by this reference to automatically suggest that they ought to work more.

This report analyzes data from the 2006 Defense Manpower Data Center (DMDC) Survey of Active-Duty Spouses to assess the prevalence and patterns of underemployment among military wives, how underemployment among military wives compares to underemployment among similar civilian wives (that is, wives of men who are not in the military), and whether underemployment affects life satisfaction.

We excluded male spouses because there were too few of them in the dataset.

NILF and Educational Mismatch Are Prevalent Among Military Wives

A simple examination of the distribution of military wives by LUF labor force position category reveals that 43 percent of military wives are NILF (not looking for work and not conditionally interested in work). Furthermore, the subunemployed category is not at all prevalent among military wives (in fact, there are so few people in this category

that it was omitted from most of the analysis). Among those who are actively looking for work, most are employed in some capacity (only 12 percent are unemployed), but 38 percent have relatively high levels of education for their current jobs. Finally, patterns of employment are similar (though not identical) across different services and pay grades.

Statistical Models Reveal Several Key Patterns in Underemployment

Several individual and contextual characteristics, including race, education, citizenship status, having children under the age of 6, and husbands' pay grade are associated with large and statistically significant changes in the probability that a military wife will be in certain LUF labor force position categories. In particular, several variables are significantly associated with the probability of being NILF. The probability of a wife's being NILF increases with her husband's pay grade and with having children. African American wives are much more likely than white wives to look for work (i.e., less likely to be NILF) and more likely to be adequately full-time employed, whereas Hispanic wives are less likely than white wives to look for work. U.S. citizens are also much more likely to look for work. Finally, highly educated wives are more likely to look for work but also more likely to be underemployed by mismatch.

Notably, having moved in the past year and having a husband who deployed in the past year (oft-cited difficulties of military life) had no measurable effect on a wife's employment, conditional on other characteristics.

Differences Exist Between Military Wives and "Look-Alike" Civilian Wives

Following previous RAND research on military spouse employment, we weight a sample of civilian wives from the March 2006 Current Population Survey (CPS) to create a comparison group of "look-alike"

civilian wives who are similar to the military wives in their distribution of age, citizenship, race, education, parental status, potential experience, region of residence, and whether or not they have moved in the past year. Comparisons of military wives with their look-alikes—a group of weighted civilian wives, show that military wives have a much greater tendency to be underemployed. Military wives are much more likely than their look-alikes to be NILF. Military wives are more likely to involuntarily work part-time and to have relatively high education for their jobs than their civilian counterparts. Finally, military wives are substantially less likely to be adequately full-time employed compared with similar civilian wives. Thus, there does appear to be a significant level of underemployment among military wives, even after controlling for relevant labor market characteristics.

There Is Little Difference in Life Satisfaction Across LUF Labor Force Position Categories

Prior scientific research on the civilian population has established a link between employment and individual well-being, and this relationship is part of what motivated this report. While the DMDC survey does not directly measure well-being, it does ask military wives to indicate their level of agreement with the statement, "Generally, on a day-to-day basis, I am happy with my life as a military spouse." An ordered logistic regression analysis on military wives' level of satisfaction with the military lifestyle reveals small and insignificant differences between wives who are adequately full-time employed and those who are in most other LUF labor force categories. Only the small group of sub-unemployed wives are less likely than adequately full-time employed wives to agree with the survey statement. Thus, despite widespread underemployment among military wives, this underemployment does not necessarily translate into dissatisfaction with the military lifestyle.

Conclusion and Policy Implications

This analysis illustrates the utility of applying the LUF to military wives in order to inform DoD policy on their employment conditions. In this analysis, the LUF highlights two major realities for military wives in the labor market. First, a plurality of military wives are not in the labor force. The probability of not being in the labor force is strongly associated with husband's pay grade and family responsibility. Thus, if DoD desires to increase the level of employment for these wives, improving child care might be a policy option. Second, while many wives are able to find full-time employment, they usually have higher levels of education than their peers in the workforce. This could be because they could not find more challenging work, because they compensate for a lack of experience with additional training, or because they generally prefer less demanding work.

We cannot conclude from these results that the military lifestyle causes underemployment among military wives. Military wives who are NILF may have less of a tendency to work, regardless of their husband's occupation, so the desirability of programs encouraging them to work is not settled. Still, the higher proportions of military wives who are involuntarily part-time employed or underemployed by mismatch may be indicative of friction in the military lifestyle. Further research and additional survey questions could probe more deeply into the nature of underemployment, so that DoD can be certain that the limited resources available for military families are used efficiently in the most beneficial way possible.

Acknowledgments

We are grateful to Aggie Byers and Jane Burke of our sponsoring office for their support and assistance during this research. This research benefited from the assistance and intellectual contributions of RAND colleagues, including Meg Harrell, David Loughran, James Hosek, and Catherine Chao.

Abbreviations

ADSS	Survey of Active-Duty Spouses
BLS	Bureau of Labor Statistics
CPS	Current Population Survey
DMDC	Defense Manpower Data Center
DoD	U.S. Department of Defense
DR	doubly robust
GBM	generalized boosted model
LUF	Labor Utilization Framework
MNL	multinomial logistic
NILF	not in the labor force

CHAPTER ONE

Introduction

It is well established that the wives of active-duty service members work and earn less than comparable wives of civilian men. Oft-cited labor market disadvantages facing military spouses could cause this result, or it could simply be the case that military men are more likely to marry women who prefer to work less. This report aims to inform U.S. Department of Defense (DoD) military spouse support policies by using measures of spouses' position in the labor market that are more sensitive to various aspects of underemployment than those that have been used to date.

Military Wives' Activity in the Labor Market

A growing body of scientific studies has confirmed that military wives—that is, the civilian wives of active-duty personnel—work and earn less in the labor market (Grossman, 1981; Hayghe, 1986; Schwartz, Wood, and Griffith, 1991; Payne, Warner, and Little, 1992; Wardynski, 2000; Hosek et al., 2002; Harrell et al., 2004; Lim, Golinelli, and Cho, 2007; Little and Hisnanick, 2007). These studies show that military wives are substantially more likely to be unemployed—meaning that they are more likely to be jobless and actively looking for work—than are other married women (whom we refer to as *civilian wives*). When military wives have jobs, they are more likely to work part-time, work fewer hours in a week and fewer weeks in a year, and earn lower hourly wages than their civilian counterparts.

It is not difficult to postulate some potential reasons why being a military wife might cause this disparity. Service members are often separated from their family, and, even when they are not away, they put in long hours at work. As a result, military wives often bear a larger share of family and household responsibilities. Additional family responsibilities could interfere with securing full-time employment in the labor market. In addition, military wives must move frequently because the military requires their husbands to relocate every few years. Despite social and institutional support to buffer the effect of these moves on military families, each move could disrupt the progression of a military wife's career if her job is not easily transferable.

Despite the fact that many difficulties facing military wives have been identified, these difficulties do not completely explain all the differences in work behavior between the two groups of women. Studies have shown that substantial differences remain when researchers compare military wives with civilian wives who have similar characteristics. These studies find that military wives are less successful than civilian wives who are the same age, have a similar level of education and the same number of children, live in the same geographical region, and move as frequently. Being married to a service member seems to have a distinctly negative and not readily explicable correlation with a military wife's position in the labor market.

Association Between Underemployment and Well-Being

According to psychological and public-health research, there is a strong association between underemployment and well-being. (See Dooley, Fielding, and Levi, 1996, for a review). In recent years, researchers have focused on the effect of underemployment on mental health and physical well-being. So far, they have estimated the effects of underemployment on subjective health, functional health, birthweight of children, alcohol misuse, chronic diseases, life satisfaction, depression, positive self-concept, and job satisfaction (Dooley, Prause, and Ham-Rowbottom, 2000; Friedland and Price, 2003; Dooley and Prause,

2004). For example, Dooley and Prause (2005) found that mothers' prior underemployment predicts lower birthweight.

At this point, it is not completely clear whether the relationship between employment and well-being is causal, for several reasons. First, compelling evidence on the causal effects of underemployment is difficult to obtain because of selection bias. It is impossible to conduct randomized experiments on employment, so researchers often must rely on observing people who choose their level of employment, opening the research up to criticism over omitted variables that are not properly accounted for. This critique is especially relevant when comparing military wives to civilian wives, since there are clear (and potentially unobservable) differences between military families and the general population. In addition to selection bias, it can be difficult to identify the direction of causality. Some researchers contends that underemployment leads to poor health, but one could argue that poor health actually leads to underemployment.

Some recent studies have addressed selection bias by looking at the effects of plausibly exogenous "shocks" in employment on well-being. For instance, Browning, Dano, and Heinesen (2006) found no increase in hospitalizations for stress-related illness among displaced workers, which casts some doubt on the causal link between underemployment and well-being. Some studies have tried to circumvent reverse-causality problems by using data with repeat observations on individuals over time to ensure that underemployment precedes poor health. At this point, the amount of credible information on the causal effects of underemployment is limited.

In spite of the difficulties in identifying the true causal effects of underemployment, the consistent correlation between underemployment and well-being is enough to warrant investigation by DoD. Since the demands of military life likely inflict some degree of underemployment on the spouses of military members, it is wise for DoD to investigate and monitor the extent and effects of such underemployment.

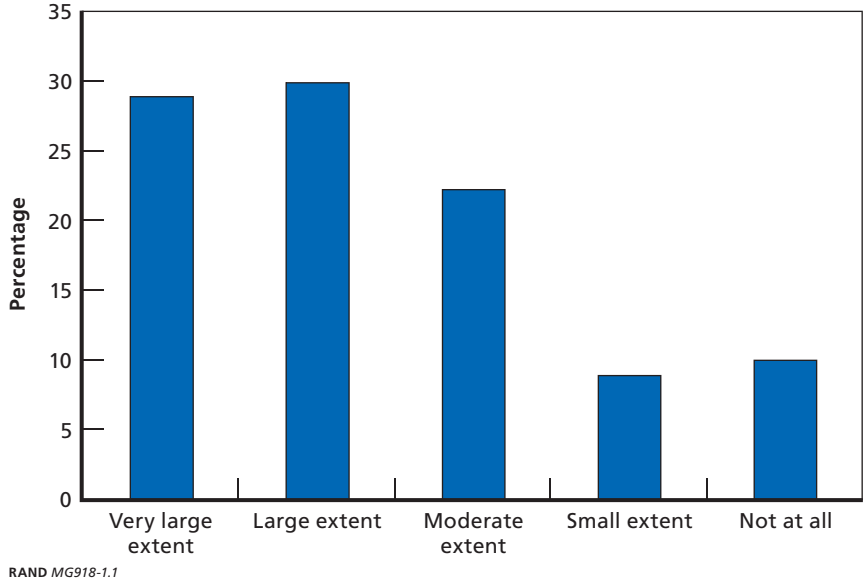
Military Wives' Employment and DoD

If the military lifestyle does cause underemployment, DoD should be concerned, for two reasons. First, DoD as an organization recognizes the sacrifices that military families make and has a duty to support them in return. Second, the retention of trained personnel is a priority for DoD, and spouse employment may affect decisions to stay or leave.

DoD (on its own initiative) assumes the responsibility to care for military families in return for the sacrifices they bear. It articulates this philosophy in a 2002 report entitled *A New Social Compact: A Reciprocal Partnership Between the Department of Defense, Service Members, and Families*. In addition to what the title implies, this "social compact" specifically states, "Of primary importance to military families is the assurance that the Department is prepared to underwrite family support" (DoD, 2002, p. 13). It calls for support for housing, education, child care and health care for service members and their families. Part of this social compact commits DoD to alleviate difficulties that military wives face in the labor market.

Secondly, spouse underemployment could affect retention. Because the military workforce is a closed system, DoD must grow its leaders from within. The process of developing these leaders takes time and resources. In the era of the all-volunteer force, DoD must do everything it can to keep well-trained professionals from leaving its workforce. For most service members, the decision to join the military may have been made as an individual, but the decision to remain in the military has to be made as a member of a family. More than half of active-duty personnel are married (DMDC, 2004). Although there are no scientific studies of how military spouses influence the career decisions of active-duty personnel, there is some evidence of such an influence. In 2006, the Defense Manpower Data Center (DMDC) asked 10,251 military wives: "To what extent do you feel that you have a choice in whether your spouse stays on active duty?" As Figure 1.1 shows, a large majority of military spouses feel that they have a say in whether their spouses stay in the military.

Figure 1.1
Most Military Wives Believe They Have a Strong Influence on Their Active-Duty Husbands' Decisions as to Whether to Remain in the Military



RAND *MG918-1.1*

Moreover, reflecting societal trends in the U.S. population, and despite the household burdens on military wives, a majority of military families are still two-income households (DMDC, 2004). Thus, a persistent lack of employment opportunity affects a spouse's quality of life, and perennial dissatisfaction with life could affect retention.

RAND's Analysis of Military Wives' Underemployment

To fully support military wives' efforts to gain adequate employment and to evaluate the effectiveness of its policies, DoD needs to measure military wives' labor market conditions and monitor the changes. To assist DoD with this effort, RAND published a report (Lim and Golinelli, 2006) that reviewed different measures of employment conditions. The authors identified the employment measures set forth in the Labor Utilization Framework (LUF) (see Hauser, 1974) as the

most suitable for capturing military spouses' labor market position and behavior. They also proposed ways for DoD to routinely collect the data required to construct the LUF measures.

The current study takes the next step in monitoring military spouses' labor market positions under the LUF. Because enough data were available to begin using the LUF measures, we were able to construct those measures using data on military spouses and to more closely examine their utility to DoD. We then analyzed those data to answer the following questions:

1. How prevalent is underemployment among military wives?
2. What characteristics of military wives are associated with the various levels of underemployment?
3. Are military wives more likely to be underemployed compared with similarly situated civilian wives?
4. Does underemployment affect their well-being?

This report addresses the research questions by first describing the LUF framework in detail (Chapter Two) and then characterizing the population of military spouses using the LUF underemployment measures (Chapter Three). Chapter Four identifies the characteristics of military wives that relate to the different levels of underemployment, while Chapter Five tests whether underemployment among military wives is more prevalent than among similar civilian wives. Chapter Six explores whether there is a relationship between underemployment and well-being, as shown by military wives' responses to survey questions on life satisfaction. Finally, Chapter Seven presents conclusions from the analysis and makes policy recommendations.

Data Used

To answer these research questions, this report uses data on military wives from the 2006 Survey of Active-Duty Spouses (ADSS) conducted by the Defense Manpower Data Center (DMDC). This dataset includes spouses of active-component personnel in the Army, Navy,

Marine Corps, and Air Force.[1] To be eligible for the survey, spouses must be married to a service member with at least six months of service who is below flag rank.[2] The ADSS was administered both via the Web and by mail between November 2005 and June 2006. A total of 11,138 eligible spouses out of 36,054 returned surveys; the weighted response rate was 32.7 percent. We excluded male spouses because there were too few of them in the dataset. The final military dataset for this analysis consisted of 10,251 military wives who were between the ages of 16 and 65 at the time of the survey.

Data on civilian wives came from the March 2006 Current Population Survey (CPS), also known as the Annual Social and Economic Supplement, conducted by the Census Bureau. The CPS includes data on a multistage probability sample households in the U.S. noninstitutionalized population, collected by either telephone or personal interviews in February, March, and April 2006.[3] The Census Bureau selected approximately 97,400 housing units, of which about 83,800 were determined to be eligible and about 76,700 were interviewed. The total household response rate for the March 2006 CPS was 83.3 percent. To construct the civilian dataset, we used only data on married women between ages 16 and 65 who were not retired or disabled. We excluded couples from the civilian dataset if either spouse was in the military. The civilian dataset consisted of 29,079 civilian wives.

---

[1] The data do not include spouses of Guard or Reserve personnel.

[2] DMDC constructed the sampling frame from Active-Duty Pay Files, Basic Allowance for Housing Population Files, and the Defense Enrollment Eligibility Reporting System Medical Point-in-Time Extract. The sampling frame for the survey contained 740,025 records identified as eligible.

[3] The sampling frame is based on the decennial census, which is updated for new residential construction.

CHAPTER TWO

Employment Measures Based on the Labor Utilization Framework

Lim and Golinelli (2006) reviewed possible measures of military spouse labor utilization and concluded that traditional Bureau of Labor Statistics (BLS) measures were insufficient to capture the degree of underemployment among military spouses. They recommended that DoD use the Labor Utilization Framework (LUF) to monitor military spouse employment. This chapter begins with a review of traditional BLS measures, then follows with a description of the LUF.

BLS Measures

The BLS releases monthly labor market measures, the best-known of which is the unemployment rate. As renowned sociologist Cliff Clogg wrote of the unemployment rate: "It is difficult indeed to conceive of another socioeconomic statistic that has been more influential in public policy debate, more critical in the shaping of modern political cleavage, or more central to social scientific theory about the socioeconomic order in the United States" (Clogg, 1979, p. 2). The unemployment rate is defined as

$$\text{Unemployment rate} = \frac{\text{Unemployed}}{\text{Labor force}}.$$

While this may seem straightforward, some clarification is necessary to interpret the unemployment rate properly. First, an unemployed person is not the same as a jobless person. For the purposes of the BLS

measure, unemployed persons are *those jobless persons who are actively looking for work* during the week in which the Census Bureau conducts the monthly CPS. The BLS defines the labor force as the sum of unemployed and employed persons.

This definition has troubled researchers, including those at the BLS, for as long as it has been in existence (Bregger and Haugen 1995). Based on the BLS definition, when a greater number of jobless persons become too discouraged to be looking for work, the unemployment rate declines, other things being equal, even though the number of jobless people has not. Conversely, the unemployment rate rises as a greater number of jobless persons feel optimistic enough to look for work. As a result, the unemployment rate is incomplete and can be misleading as an overall indicator of the population's employment conditions.

Adequacy of BLS Standard Employment Measures for Military Wives

Lim and Golinelli (2006) reviewed all BLS employment measures, including the unemployment rate, and concluded that DoD needed to go beyond traditional BLS measures (e.g., job versus no job) to fully monitor the problems that military wives may experience in the labor market. They argued that the standard measures neither recognize subtle differences among jobless individuals nor capture important differences among individuals with jobs.

For example, some jobless military wives are possibly not looking for work because they have become discouraged with the job search. The standard employment measures would exclude this group of military wives from the labor force and combine them with others who are voluntarily not in the labor force (NILF). Similarly, military wives may not be actively seeking work because they have recently arrived in a new location and need more time to get acquainted with the environment. According to BLS employment measure, these wives would also be considered as NILF, even if they were in the labor force until their move and will start looking again in a matter of weeks.

Furthermore, some military wives with jobs may still be underutilized. The need to provide additional income for the family may have forced them to settle for a less-than-ideal job for which they are underpaid or overqualified or one that offers only part-time employment when they would prefer full-time. Some military installations are in rural areas, where the demand for a high level of education or special skills may be lower. With the standard BLS measures, DoD cannot capture such underemployment among military wives.

LUF Measures

In 1974, Philip Hauser introduced the Labor Utilization Framework to more fully capture various types of economic hardship that standard BLS employment measures overlook (Hauser, 1974; Clogg, 1979). Hauser aimed to develop "a conceptual framework and operating procedures to obtain measurement of both visible and invisible underemployment" (pp. 4–5). In the LUF, he proposed to divide the population into five conceptual groups:

- Utilized adequately
- Utilized inadequately
  - By unemployment
  - By hours of work
  - By income level
  - By mismatch of occupation and education.

The LUF has evolved since 1974, but its main purpose remains to capture work time lost, income deficiency, and the mismatch of workers' skill attainment with required job skills (Clogg, Eliason, and Leicht, 2001). For military wives, Lim and Golinelli (2006) recommended that DoD use measures that captured (1) a person's labor force *behavior* throughout the previous year and (2) a person's labor-force *position*.[1]

[1] Early studies of LUF did not include measures of labor force behavior, but Clogg, Eliason, and Wahl (1990) proposed a modification to the original framework that contained these two measures.

LUF Measures of Labor Force Behavior

Measures of labor force *behavior* encompass all activities within the past year, as opposed to those occurring only within the CPS reference week. These measures are designed to group people based on how consistently they engaged in labor over the course of the year. The LUF labor force behavior measures consist of ten mutually exclusive categories grouped into three broader labor force states: stable inactive, unstable active, and stable active. Table 2.1 presents a more specific breakdown. Persons who are stable inactive (category 1) did not work or look for work in the previous year. Persons who are stable full-time active (category 10) worked full-time for the entire year. Some of them may have changed jobs, but they did so without interruptions in their employment. The remaining portion of the population, the unstable

Table 2.1
Categories of Labor Force Behavior, Past Year

Category/Name	Description
Stable inactive	
1 NW-NL	Nonworker
Unstable active	
2 PTPY-NL	Part-time, part-year worker, not looking
3 PTPY[15+]	Part-time, part-year worker, looked 15+ weeks
4 PTPY[14]	Part-time, part-year worker, looked 1–14 weeks
5 FTPY-NL	Full-time, part-year worker, not looking
6 FTPY[15+]	Full-time, part-year worker, looked 15+ weeks
7 FTPY[14]	Full-time, part-year worker, looked 1–14 weeks
8 PTFY-OTHER	Part-time, full-year worker, voluntary
9 PTFY-INVOL	Part-time, full-year worker, involuntary
Stable full-time active	
10 FTFY	Full-time, full-year worker

SOURCE: Lim and Golinelli, 2006.

active portion, is divided into eight groups. Exactly where the LUF classifies people in these eight groups depends on whether they are part-time or full-time workers, part-year or full-year workers, how long they searched for work in the past year, and whether their work status is voluntary. Clogg, Eliason, and Wahl (1990, p. 1541) wrote, "as a whole, this set of worker types represents 'reserve' labor, which stands outside the stable core; the set represents marginal workers of varying types."

LUF Measures of Labor Force Position

Measures of labor force position are designed to group people by how they are employed at a point in time. These measures divide all people into eight categories according whether or not they are looking for work, their reasons for not looking for work, how many hours they worked, their educational qualifications, and their earnings.

Table 2.2 summarizes these categories. The LUF measures of labor force position are much more precise than the traditional BLS measures. First, the LUF splits those who are not in the labor force (i.e., not looking for work) into two categories: those who are not interested in work (category 1) and those who gave up looking for work because they became discouraged at a lack of opportunity (category 2). In addition, the LUF identifies employed persons who are underutilized by creating categories for part-time employees who would work full-time if it were available (category 4), full-time employees whose earnings are close to the poverty threshold (category 6), and full-time employees with satisfactory earnings who have relatively high levels of education for their jobs (category 7). The LUF categorizes anyone who does not fall into one of the first seven categories as adequately full-time employed (category 8).

Constructing LUF Labor Force Position Measures

Lim and Golinelli (2006) recommended that a list of survey questions be incorporated into the existing DoD surveys to provide enough information to construct these LUF labor force behavior and position measures. The DMDC then incorporated questions that enabled us

Table 2.2
Categories of Labor Force Position, Reference Week

Category/Name	Description
1 NW-NL	Not in the labor force—economically inactive and not seeking employment in the labor market
2 S-U	Subunemployed—discouraged and conditionally interested workers according to their survey responses
3 U	Unemployed—the same as the BLS definition
4 H-I	Part-time employed (less than 35 hours per week)—involuntary
5 H-V	Part-time employed (less than 35 hours per week)—voluntary
6 I	Underemployed by low income (earnings)—employment that does not provide annual income greater than or equal to 125 percent of the poverty threshold
7 M	Educational mismatch—years of education that are more than one standard deviation above the occupational average
8 Adequate full-time	Full-time workers with adequate income—residual category

SOURCE: Lim and Golinelli, 2006.

to construct all the LUF labor force position measures for military wives.[2]

The first challenge in constructing the LUF labor force position measures was the distinction between NILF and subunemployed people. Identifying subunemployed military wives is straightforward because the ADSS asks, "Why have you not been looking for work in the last four weeks?" The CPS, however, does not ask this question. Therefore, we obtain a proxy for discouraged workers by taking those (1) who are NILF at the time of the survey, (2) who identify themselves as part-year workers, and (3) whose reason for part-year work is either that they are looking for full-time work or that no work is avail-

[2] See Lim and Golinelli (2006), Appendix A, for the full set of questions that enabled the construction of LUF labor force behavior categories.

able. Clogg, Eliason, and Leicht (2001) argue that this group of people resembles discouraged workers.

Determining who is unemployed, voluntarily part-time employed, and involuntarily part-time employed is straightforward. Both surveys ask respondents if they are looking for work, how many hours per week they work, and whether they work part-time because they cannot find full-time employment.

The main task in constructing the underemployed by low-income category is determining the proper poverty threshold to use as a benchmark. For the chief income recipient, the threshold is assumed to be the family poverty threshold (which varies by the age and sex of the household head, size of the family, etc.). For secondary earners, we use the poverty threshold for a primary *individual* with the same characteristics. Those whose earnings are less than 125 percent of their respective threshold are classified as underemployed by low income.

Finally, constructing the educational mismatch category requires only knowledge of the job-specific means and standard deviations of years of education. Among full-time employees who are not classified as low-income, those with years of education that are more than one standard deviation above the mean for their occupation are coded in the mismatch category. Everyone else is classified as adequately full-time employed.

Critiques of the LUF Labor Force Position Measures

The two major critiques of the LUF labor force position measures concern the thresholds for low income and the validity of the educational mismatch category. First, critics argue that poverty thresholds are actually measures of need, not measures of underemployment. Clogg Eliason, and Leicht, (2001) respond to this argument by emphasizing that the LUF uses the poverty thresholds on a per-worker basis to construct its measures, which is different from comparing household level of income with the poverty threshold. In other words, a worker can individually be in the "underemployed by low income" category while his or her family is far from living in poverty. In addition, Clogg Eliason, and Leicht emphasize that the poverty threshold is a benchmark that is meant to be tracked over time. Thus, while different mea-

sures may reach different conclusions at a fixed point in time, their characterizations of underemployment trends should be similar.

In addition, critics dispute the "educational mismatch" category as a measure of over-qualification. First, years of education may be a poor proxy for actual skill in a job, so above-average education does not directly translate to overqualification. Also, regardless of the allocation of workers, some portion must be one standard deviation above the mean (by construction); however, this does not mean they are over-qualified. These critiques are valid, so the "educational mismatch" category should be interpreted for what it actually identifies: workers who have above average levels of education for a given occupation. These workers are not overqualified per se, but overqualification is what this admittedly imperfect measure is designed to capture.

CHAPTER THREE

The Prevalence of Underemployment Among Military Wives

The objective of this chapter is to examine the prevalence of underemployment among military wives, applying the labor force position measures of the Labor Utilization Framework. These basic results demonstrate the value of using LUF indicators to monitor the employment conditions of military spouses.

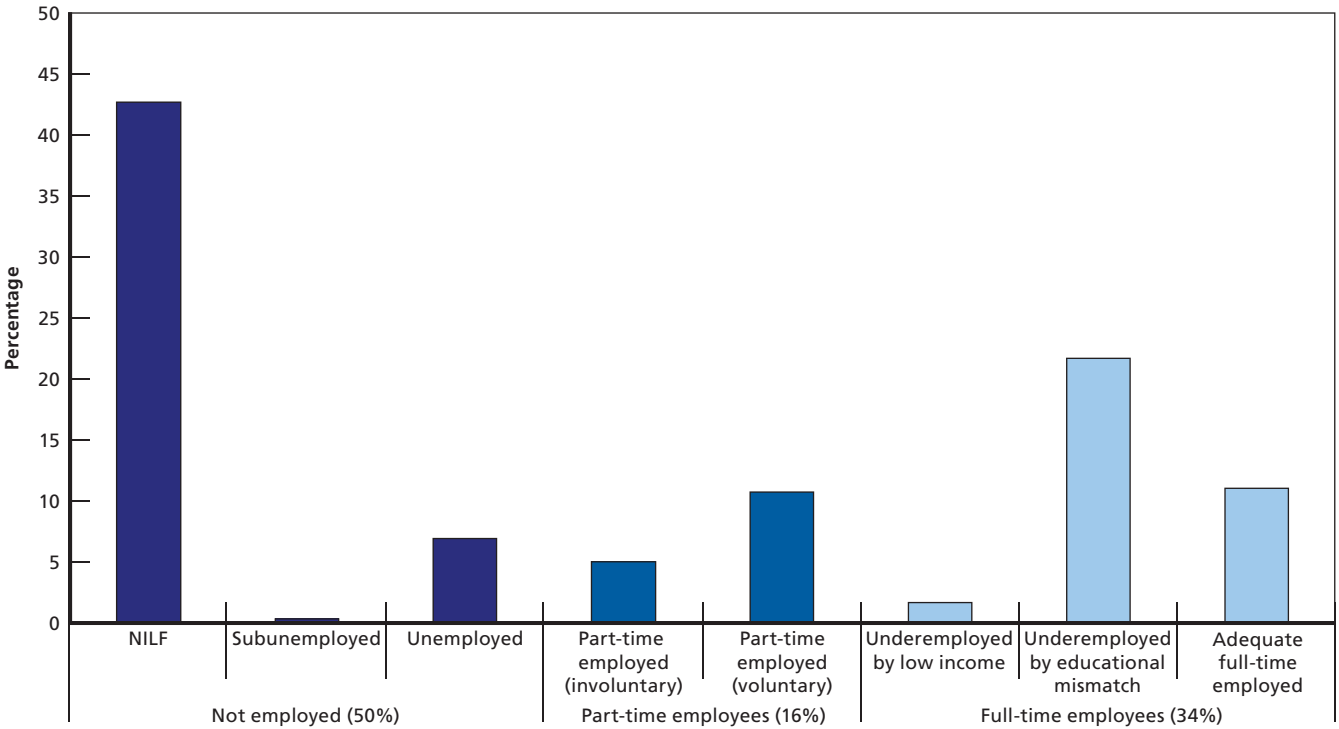
Underemployment Among Military Wives

Figure 3.1 presents the LUF labor market position of military wives in 2006, measured by means of the eight categories given in Table 2.2 in Chapter Two. As the figure shows, a plurality of military wives tend not to be in the labor force, and those who are in the labor force tend to be underemployed.[1] Almost 43 percent of military wives are not in the labor force (i.e., they are not looking for work) while 11 percent are adequate full-time employees. Thus, by the LUF definitions, most military wives are underemployed.

Figure 3.2 presents the same snapshot of military wives in 2006, but it includes only those who are in the labor force (i.e., it excludes NILF and sub-unemployed wives). The figure shows that among those

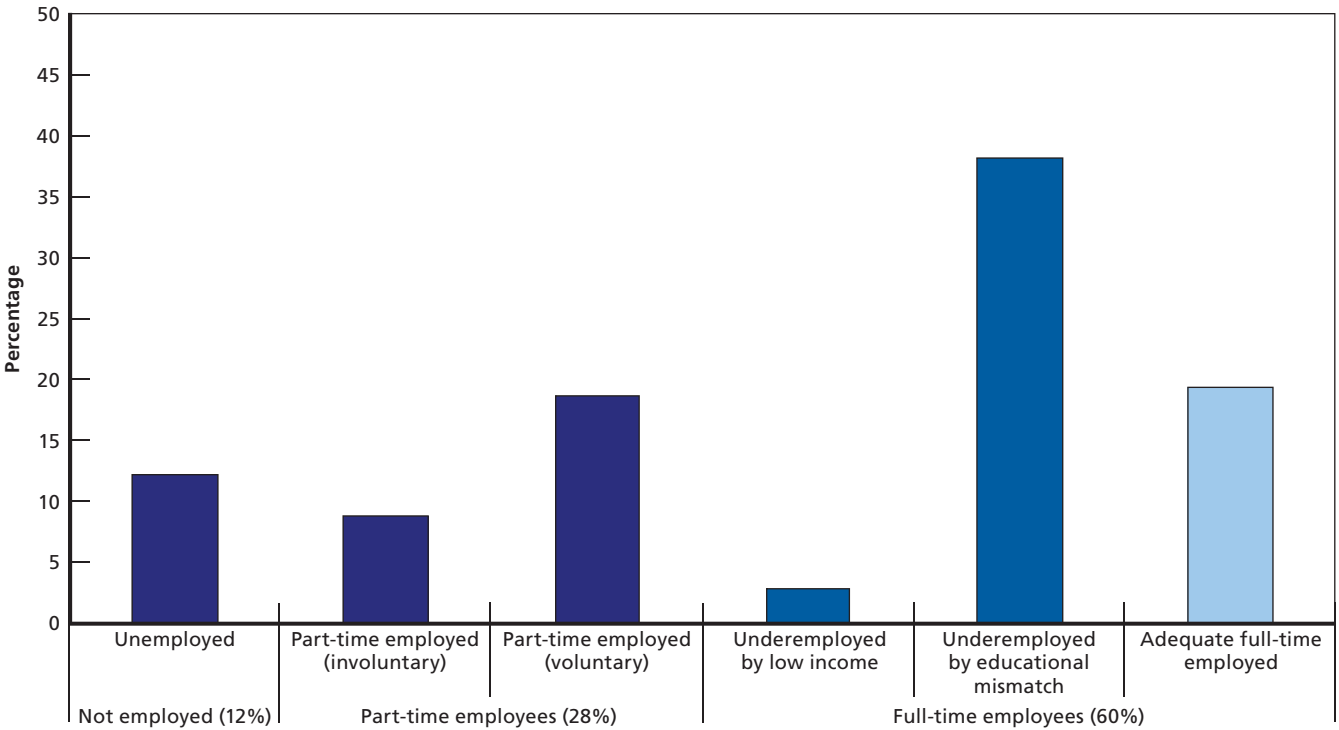
[1] We borrow the term "underemployed" from the LUF literature as a sort of shorthand to refer to anyone who is not in the "adequately full-time employed" category. We do not mean to imply anything about what their employment level should be. In subsequent chapters, "underemployed" should be interpreted as "less-than-adequately full-time employed" rather than "in need of more employment."

Figure 3.1
LUF Labor Market Position Categories Among Military Wives in 2006



RAND *MG918-3.1*

Figure 3.2
LUF Labor Market Position Categories Among Military Wives in 2006, Labor Force Only



RAND *MG918-3.2*

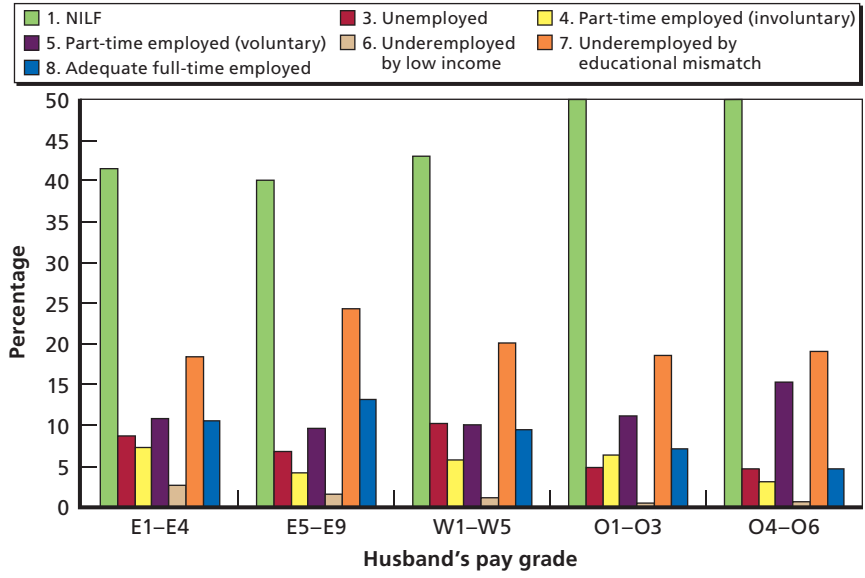
wives who do look for work, most tend to be full-time employees (60 percent). However, those who are adequately full-time employed are a minority (19 percent) and, the largest single category is "underemployed by educational mismatch" (38 percent).

Variation in Underemployment

These patterns of military wives' employment levels generally hold across their husbands' levels of military pay grade (see Figure 3.3). For each pay grade, the largest portion of wives are not in the labor force, and few are adequately full-time employed.

Still, there are small differences between wives across the various pay grades. For example, officers' wives are more likely to be NILF than either enlisted soldiers' wives or wives of warrant officers. As a corollary, officers' wives have a lesser tendency to be adequately full-

Figure 3.3
LUF Labor Market Position Categories, by Husband's Pay Grade

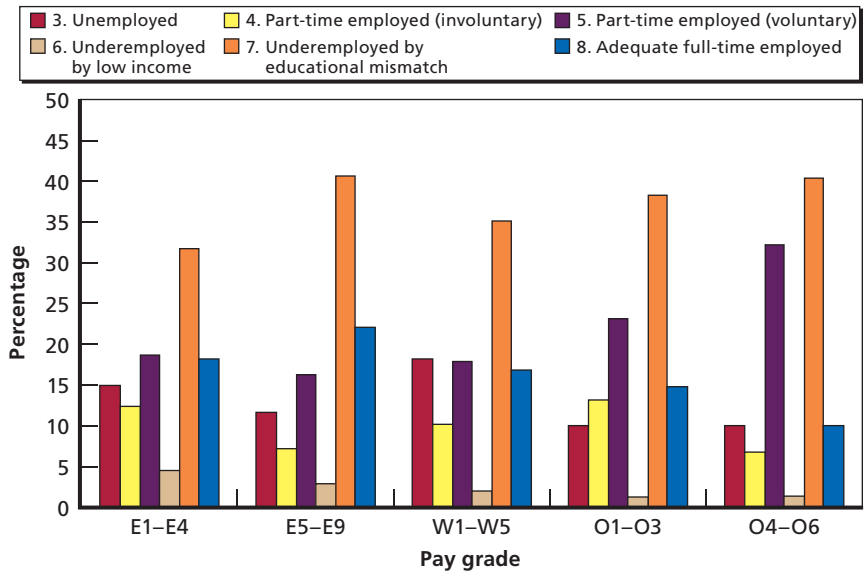


RAND *MG918-3.3*

time employed. Indeed, the smallest proportion of adequately full-time employed wives consisted of those married to husbands in the highest pay grades (O4–O6).

The same snapshot excluding wives who are NILF (Figure 3.4) provides a bit more information. Compared with wives of enlisted soldiers and warrant officers, wives of officers are less likely to be adequately full-time employed but much more likely to work part-time voluntarily. At the highest levels of their husbands' pay grade, O4–O6, only 10 percent of wives in the labor force are adequately employed full-time, but 32 percent are voluntarily employed part-time. In addition, the pay grade with the highest proportion of adequately full-time employed wives is E5–E9 (22 percent). As before, the most prevalent category for all pay grades among wives in the labor force is "underemployed by educational mismatch" (32, 41, 35, 38, and 40 percent for the respective pay grades).

Figure 3.4
LUF Labor Market Position Categories, by Pay Grade, Labor Force Only



RAND *MG918-3.4*

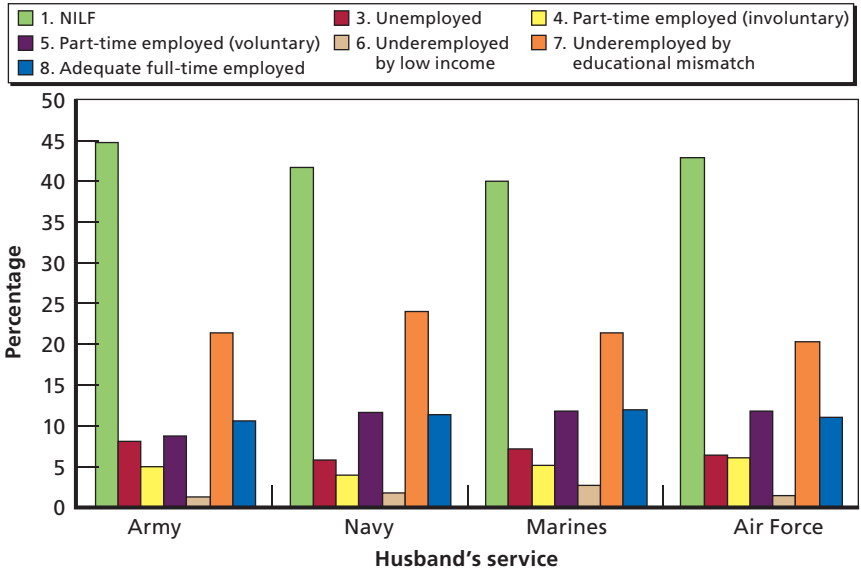
Wives' Labor Market Positions

When we compare the distribution of LUF categories across the four military services, we see no large differences. Figure 3.5 shows that the rate of adequate full-time employment is around 11–12 percent for all services, while the percentage who are unemployed hovers around 6–8 percent. Wives of Army servicemen appear slightly less likely to work part-time voluntarily and slightly more likely to be NILF than the other services. It does not appear, in aggregate, that wives from any one service are particularly less active in the labor market.

Usefulness of the LUF Labor Market Categories

These figures highlight the usefulness of examining the employment conditions of military wives under the LUF. The LUF categories go

Figure 3.5
LUF Labor Market Position Categories, by Service



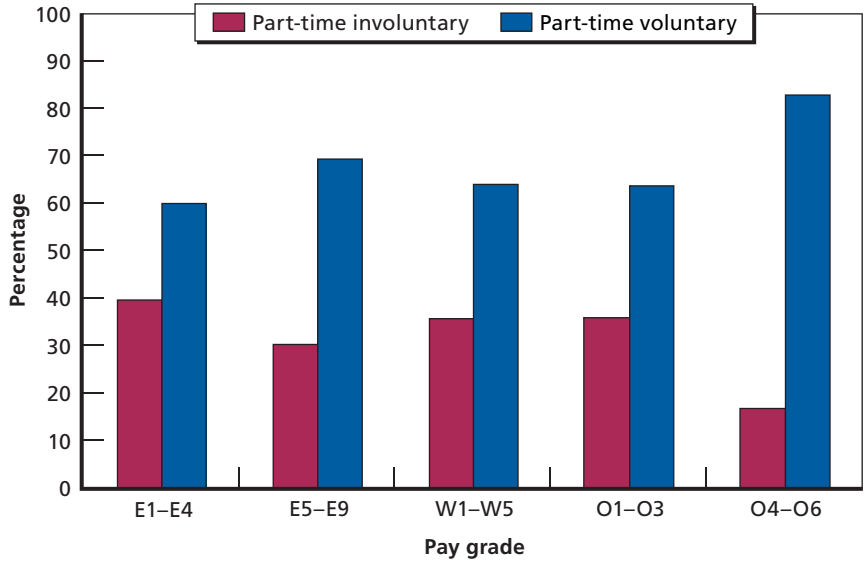
RAND *MG918-3.5*

beyond the basic BLS labor utilization statistics in ways that are particularly relevant for military wives. For instance, the LUF categories show that the vast majority of military wives who are not actively seeking work are not conditionally interested. As shown in Figure 3.1, hardly any wives fell into the "subunemployed" category, which specifically includes those who are discouraged but interested in work if labor market conditions improved. Thus, wives who are NILF are mostly inactive for reasons other than discouragement at lack of opportunity.

In addition, the LUF categories reveal an important distinction in wives who work part-time. Under the LUF, it is possible to distinguish those who work part-time by preference from those who work part-time because of a lack of opportunity. Notably, as shown in Figure 3.6, wives of officers in higher pay grades (and thus those with higher incomes) are more likely to prefer only part-time work.

Finally, the LUF categories reveal the fact that many military spouses who are full-time employees would still be considered under-

Figure 3.6
Comparison of Part-Time Workers, by Pay Grade



RAND *MG918-3.6*

employed by the LUF. In these data, the largest LUF category among spouses in the labor force was consistently "underemployed by educational mismatch." This prevalent type of underemployment would have been buried in traditional labor force statistics that do not make any distinctions among full-time employees.

These data suggest that the employment situation of military spouses would not be fully captured by traditional BLS measures. The implementation and use of LUF categories reveal important information to DoD policymakers about the labor market conditions of military spouses.

CHAPTER FOUR

Identifying the Determinants of LUF Labor Market Position

The previous chapter described the data and some relationships between the aggregate number of wives in the various LUF categories and their husbands' position within DoD. This chapter uses the rich individual information in the DMDC data to identify which characteristics are most important in determining a military wife's labor market situation. While the cross-sections of the previous chapter are useful for painting a descriptive picture, such descriptions cannot simultaneously assess the importance of all characteristics at once. This chapter looks at several unique aspects of military life, such as spouse deployment and frequent moving, to see which ones have a significant effect on military wives' labor market positions.

Multinomial Logistic Regression

All military spouses face special circumstances when deciding to take up some kind of employment. Within each circumstance, different people opt for different kinds of employment. Thus, one way to think of a military wife's employment decision is in terms of a probability. For instance, one way to interpret Figure 3.1 would be to say that there is a 42.8 percent probability that a given military wife will be NILF.

A multinomial logistic (MNL) regression analyzes the probability that a wife falls into each of the eight employment categories in the

LUF.[1] The MNL model assumes that the probability is a function of a set of individual characteristics that may affect the labor force opportunities available. For example, wives with more education should have a greater chance of being overqualified for their job (i.e. being in the "educational mismatch" category), all else being equal.

The framework assumes that wives will fall into whatever category they prefer most. Under this assumption, it is possible to use the observed employment levels in the data to make inferences about the probabilities underlying the process and the effects of the various characteristics on individual decisions. This forms the basis for the MNL model.[2]

Regression Analysis Results

The most intuitive way to present the results of a MNL model is to calculate the average marginal effect of each characteristic on the probability of being in each LUF category.[3] The *average marginal effect* for a given characteristic and employment category is the average effect of a change in the characteristic on the predicted probability of being

---

[1] The MNL model assumes the unobserved determinants of LUF labor force position category follow a type 1 extreme value (Gumbel) distribution. This allows the probability that individual i chooses option j to be written as follows for $l = 1,\ldots, J$:

$$\Pr\left(Y_i = j \mid x_i\right) = \frac{e^{x_i'\beta_j}}{\sum_{l=1}^{m} e^{x_i'\beta_l}}.$$

[2] As a technical necessity, the coefficients for one LUF category must be set to zero for identification purposes (i.e. all probabilities must sum to 1, so we only need J–1 sets of parameters). This is convenient for this application, since the primary outcome of interest is adequate full-time employment. The model, then, will estimate the probability of choosing each category over being adequately full-time employed. Using the previously specified form for the probability that an individual makes the observed choice, the MNL model estimates the parameters by maximum likelihood.

[3] For the MNL model, the marginal effect of x_1 on the probability of being in category j is

$$\frac{\partial P_j}{\partial x_i} = P_j\left[\beta_j - \sum_{k=1}^{J} P_k\beta_k\right],$$

in each category. For a categorical variable (service, pay grade, etc.) the average marginal effect for each category is the average effect of being in that group on the probability, *relative to the base category*.

In addition, the marginal effects should be interpreted as the change in probability associated with the change in the characteristic, *holding all else constant* (i.e., controlling for other factors). This point represents a crucial advantage of regression analysis over snapshots of the raw data: Inference about the effect of a characteristic is possible without being confounded by differences between services, pay grades, deployments, etc. Table 4.1 displays a complete list of the variables included in the model.

Difference Between Services

Regression analysis confirms that there is little difference between the services in the probability of being in any one of the categories. Table 4.2 summarizes the average marginal effects for each service on the probability of being in each LUF labor market category.[4] The boldface numbers in this table and the following tables represent marginal effects that are statistically significant.[5] As the table indicates, wives of Navy and Marine Corps servicemen were slightly more likely to be voluntarily part-time employed compared with wives of Army soldiers (3.2 and 3.4 percent, respectively). In addition, wives of Marines were 8.5 percent less likely to be NILF. Wives of Navy servicemen were 2 percent less likely than wives of Army servicemen to be unemployed.

---

where P_j is the predicted probability of being in category *j*. This formula will calculate a marginal effect for each individual, so the average marginal effect is this calculation averaged over the entire dataset.

[4] Subunemployed and underemployed by low income were excluded due to small sample size.

[5] Statistically significant average marginal effects are those that can be confidently distinguished from zero at the 95 percent significance level. The standard errors used in hypothesis tests were calculated with the nonparametric bootstrap.

Table 4.1
Individual Characteristics Included in MNL Regression on LUF Labor Market Position

Variable	Values
LUF labor market category (outcome variable)	NILF Unemployed Part-time (involuntary) Part-time (voluntary) Educational mismatch Adequate full-time employment (base category)
Service	Army (base category) Navy Marine Corps Air Force
Pay grade	E1–E4 (base category) E5–E9 W1–W5 O1–O3 O4–O6
Race	White (base category) Black Hispanic Other
Education	Less than high school (base category) High school Some college College degree Graduate school
Housing situation	Military on-base (base category) Military off-base Civilian rent Civilian own
Region	Northeast (base category) Midwest South West
Other variables	Has children U.S. citizenship Years of potential labor market experience Moved within the past year Service member deployed at least 30 days in past year

Table 4.2
Average Marginal Effects of Husband's Service on Probability of Being in Each LUF Category Relative to the Army

Service	NILF	Unemployed	Part-Time Involuntary	Part-Time Voluntary	Educational Mismatch	Adequate Full-Time Employment
Army (base)						
Navy	–0.035	**–0.023**	–0.008	**0.032**	0.031	–0.001
Marine Corps	**–0.085**	–0.008	0.003	**0.034**	0.000	0.009
Air Force	–0.046	–0.012	0.009	0.030	–0.004	0.003

Differences in LUF Labor Market Position Across Pay Grades

The average marginal effects of the different pay grade categories are also consistent with the patterns in Chapter Three (see Table 4.3). First, the probability of being NILF increases rapidly with increasing pay grade. Wives of E5–E9 servicemen were 13 percent more likely than those of E1–E4 servicemen to be NILF; having a husband who was an O4–O6 increased the probability of being NILF by 74 percent (relative to pay grades E1–E4). Similarly, the probability of adequate full-time employment decreases as husbands' pay grades increase. Wives of warrant officers, O1–O3 officers, and O4–O6 officers had decreases

Table 4.3
Average Marginal Effects of Husband's Pay Grade on Probability of Being in Each LUF Category, Relative to E1–E4

Category	NILF	Unemployed	Part-Time Involuntary	Part-Time Voluntary	Educational Mismatch	Adequate Full-Time Employment
E1–E4 (base)						
E5–E9	**0.132**	**–0.019**	**–0.017**	–0.011	–0.001	–0.013
W1–W5	**0.355**	–0.004	–0.002	0.016	–0.087	**–0.055**
O1–O3	**0.551**	–0.023	–0.012	–0.007	**–0.146**	**–0.065**
O4–O6	**0.740**	–0.017	**–0.038**	**0.070**	**–0.175**	**–0.114**

of 5.5 percent, 6.5 percent, and 11.4 percent, respectively, in the probability of adequate full-time employment. Furthermore, wives of O4–O6 officers were 7 percent more likely to be voluntarily part-time employed than wives of E1–E4 servicemen.

Racial/Ethnic Differences in LUF Labor Market Position

The patterns in the probabilities of being in the various LUF categories differ by race/ethnicity. Table 4.4 summarizes the racial/ethnic differences in the probability of being in each LUF category. All minorities were more likely than whites to be unemployed. For African American women, this result stems from a greater propensity to look for work, since this group was 30 percent less likely to be NILF. In contrast, Hispanic wives are more likely to be both unemployed and NILF. African American and Hispanic wives were also more likely to have relatively high levels of education (i.e., be underemployed by educational mismatch).

Level of Education

Table 4.5 summarizes the average marginal effects of education on the probability of being in each LUF category. Women with higher levels of education are much less likely then women with less than a high school diploma to be NILF (38 and 58 percent less likely for those with some college and college degrees, respectively). Thus, more-educated wives

Table 4.4
Average Marginal Effects of Race/Ethnicity on Probability of Being in Each LUF Category, Relative to White

Race/ Ethnicity	NILF	Unemployed	Part-Time Involuntary	Part-Time Voluntary	Educational Mismatch	Adequate Full-Time Employment
White (base)						
African American	**–0.304**	**0.051**	–0.009	–0.018	**0.066**	**0.040**
Hispanic	**0.095**	**0.027**	–0.013	–0.032	**0.084**	**–0.037**
Other	0.091	**0.035**	0.010	**–0.058**	–0.011	–0.013

Table 4.5
Average Marginal Effects of Education on Probability of Being in Each LUF Category, Relative to Less Than a High School Education

Education	NILF	Unemployed	Part-Time Involuntary	Part-Time Voluntary	Educational Mismatch	Adequate Full-Time Employment
Less than a high school education (base)						
High school	–0.229	–0.018	0.051	0.057	0.002	0.021
Some college	**–0.379**	**–0.038**	0.048	0.071	–0.006	0.058
College degree	**–0.575**	–0.034	0.054	0.074	0.124	0.061
Graduate school	–0.310	–0.002	**0.088**	**0.136**	**0.576**	**–0.152**

are more likely to look for work. The only significant difference in the probability of adequate full-time employment was for wives who had been to graduate school (15 percent less likely). This could be because they are much more likely to be underemployed by educational mismatch and more likely to work part-time (either involuntarily or voluntarily) than are wives with less than a high school education.

Difficulties Unique to the Military

Though often cited as a source of extreme difficulty for women seeking employment, the effects of husband's deployment and frequent moving do not appear to be very large (see Table 4.6). The variables for whether a family moved in the past year and whether the husband deployed in the past year had no significant relationship with any of the LUF categories. On the other hand, having children was associated with a 50 percent increase in the probability of being NILF, while U.S. citizenship was associated with a 22 percent decrease in the probability of being NILF and about a 5 percent increase in the probability of adequate full-time employment.

Table 4.6
Average Marginal Effects of Other Variables on Probability of Being in Each LUF Category

Variable	NILF	Unemployed	Part-Time Involuntary	Part-Time Voluntary	Educational Mismatch	Adequate Full-Time Employment
Has children	**0.495**	−0.007	**−0.031**	0.014	**−0.109**	**−0.069**
U.S. citizenship	**−0.222**	0.006	−0.020	−0.025	0.046	**0.046**
Possible years experience	0.000	0.000	**−0.001**	**−0.002**	0.001	0.001
Moved within past year	−0.122	0.024	0.022	0.102	−0.090	0.005
Deployed > 30 days in past year	0.048	0.002	0.000	−0.004	0.011	−0.012

Summary

MNL regression analysis confirms some intuitive relationships between individual military wife characteristics and their labor market position, as measured by their LUF category. There are no extreme differences between labor market opportunities for wives of men in different services. Wives of servicemen in higher pay grades are much more likely not to look for work or to be voluntarily part-time employed. More-educated women are more likely to look for work, but they also tend to have relatively high levels of education for their jobs. Finally, wives with children were much less likely to look for work, and wives who are U.S. citizens were much more likely to look for work and more likely to be adequately full-time employed. Still, MNL regression analysis failed to confirm commonly held perceptions of the difficulties facing military spouses. Notably, whether the husband deployed or the family had moved in the past year did not have any significant effect on the wife's level of employment.

CHAPTER FIVE

Comparison of Military and Civilian Wives' Employment Conditions

Previous chapters examined the determinants of military spouse labor force position and showed that military spouses tend to be underemployed by the LUF definition. Both of these analyses looked only at differences between spouses *within the military*. This chapter compares the labor force positions of military spouses to similar spouses in the civilian labor force. This type of a comparison will identify whether military spouses have a greater tendency than similar civilian spouses to be underemployed.

Likelihood of Underemployment

Figure 5.1 compares the LUF labor force position distribution of military wives (also shown in Figure 3.1) with that of women married to civilian men in the U.S. population. This comparison reveals obvious differences between the two groups. Although the plurality of military wives is NILF (43 percent), the plurality of civilian wives is adequately full-time employed (45 percent compared with 11 percent of military wives). Military wives also have a greater tendency to be unemployed (7 percent, compared with 2 percent of civilian wives), involuntarily part-time employed (5 percent versus 2 percent), and underemployed by educational mismatch (22 percent versus about 5 percent).

Figure 5.1
Underemployment Among Military and Civilian Wives

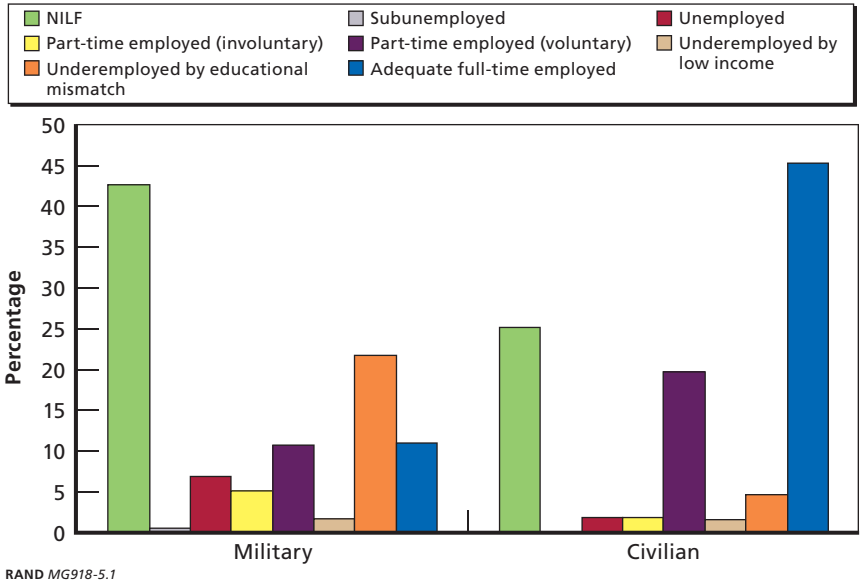
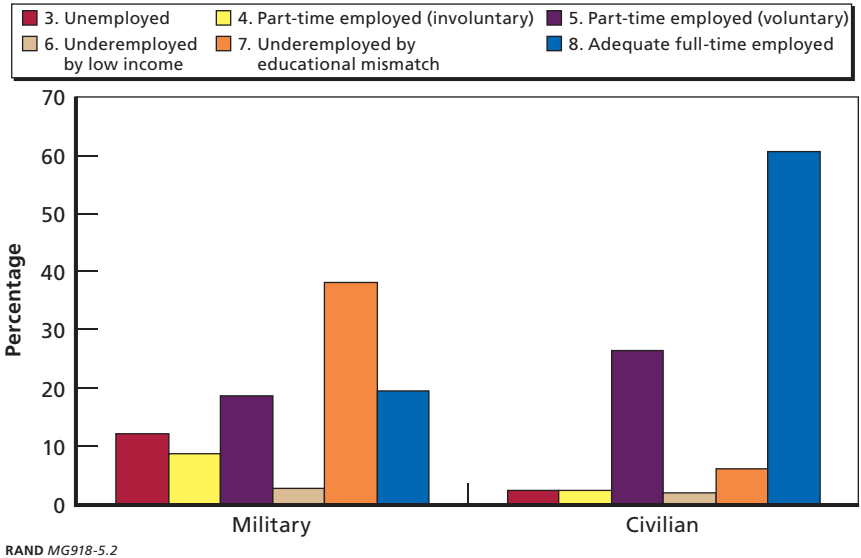


Figure 5.2 makes the same comparison between military and civilian wives for those wives who are in the labor force. Among wives who are employed or actively looking for work, the contrast is even clearer. Military wives have a much greater tendency to either be unemployed (12 percent), involuntarily part-time employed (9 percent), or underemployed by educational mismatch (38 percent), compared with civilian wives (2 percent, 2 percent, and 6 percent, respectively). Sixty-one percent of civilian wives in the labor force are adequately full-time employed, compared with 19 percent of military wives.

Propensity Score Weighting

Figures 5.1 and 5.2 provide a useful starting point for comparing military wives to their civilian counterparts, but a raw comparison cannot tell the full story. There are underlying differences between military and civilian wives that relate to underemployment but have nothing to

Figure 5.2
Underemployment Among Military and Civilian Wives, Labor Force Only



do with being a military spouse. For instance, military spouses tend to be younger and less experienced than civilian spouses. Thus, a group of civilian spouses that has more experience, on average, would naturally be more employable than their military counterparts. Since simple comparisons do not account for such differences, they likely overstate the degree of underemployment among military spouses relative to civilian spouses.

Propensity score weighting is a statistical technique that can be used to remove the influence of other characteristics from the comparison to make possible a clean look at how military wives compare with similar civilian wives. This technique assigns a weight to civilian spouses based on how similar they are to the military spouses.[1] For instance, younger, less-experienced civilian spouses receive more weight since they are

[1] To calculate the weight, we combined the military and civilian spouses into a single dataset and predicted the probability of being a military spouse based on an individual's characteristics. In this application, we calculated the probability using a generalized boosted regression. The weight for an observation is equal to the odds of being a military spouse

more comparable to the military spouses. The weighted civilian spouse group is designed to imitate how military spouses would fare in the labor force if they were not married to members of the military.

One way to think of this propensity weighting analysis is as a way to prepare data to create more-robust comparisons. A sample comparison of means makes no assumptions, but it also does not attempt to control for individual factors that could confound the comparison. The MNL regression models the probability of being in each category and controls for relevant variables, but it relies on assumptions about the functional form of the characteristics and the distribution of the unobservable determinants of labor force position. This is known in the literature as the model dependency of using extreme counterfactuals (King and Zeng, 2006). By weighting the civilian spouses by how similar they are to the military spouses, propensity score weighting reduces differences between the two groups and enables us to make comparisons in the data without making strong assumptions about the functional form of individual tastes or unobserved characteristics (see also Ho et al., 2007).

Furthermore, in the case where the weight does not fully control for differences between the two groups, it is then possible to put the military spouses and weighted civilian spouses through the MNL regression and control for any remaining differences.[2] After weighting the civilian spouses so that they "look" similar to the military spouses, only small differences (if any) should remain between the two groups in the variables that could confound the military-civilian comparison.[3] The assumptions underlying the MNL regression are not nearly as risky when the two groups match on all the individual characteristics. This approach is known as "doubly robust (DR) estimation" in the statistical literature. The results are doubly robust, because the propensity

(i.e., $p_{milspouse}/1-p_{milspouse}$). For further description, see McCaffrey, Ridgeway, and Morral, 2004.

[2] This type of analysis is sometimes referred to as "doubly robust" because it uses a model to control for variables after attempting to remove differences with propensity weighting.

[3] See Appendix A for descriptive statistics on how well look-alike civilians compare to military spouses.

score weighting provides one type of robustness through reducing the model dependency and the regression provides another type of robustness through an additional control for potential confounding variables (Imai, King, and Stuart, 2008; Kang and Schafer, 2007). For a more in-depth description of DR estimation, see Appendix D.

Thus, in this chapter we create a population of "look-alike" civilian spouses in each labor force position category by first weighting the civilian spouses, so that they are similar to military spouses, and then using the MNL regression to purge any remaining small differences between the two groups.[4] It is important to stress that the methods this report employs are *not* a solution to omitted-variables bias. Any unobservable differences that correlate with being a military spouse and underemployment will bias the DR analysis as much as any other technique. Thus, DR analysis only accounts for variables in the model and can still be confounded by variables that are omitted.

Table 5.1 summarizes the variables that we controlled for in our analysis.

Table 5.2 shows the raw differences between the two groups for each characteristic we control for.

There are significant underlying differences between civilian and military wives in each of the variables included in the model. The median military wife tends to be slightly more educated, although more civilian wives have college and graduate degrees. Military wives tend to be much younger, and a higher percentage of them are African American and Other race/ethnicities. Military wives have much less potential experience (not surprising since this variable derives directly from age), and they are much more likely to reside in the South or West regions. Finally, almost all military wives in the dataset had moved in the past year, whereas only 10 percent of civilian wives shared this trait.

[4] In fact, this technique does not actually "create" a new population; rather, it adjusts the civilian population to permit an unconfounded direct comparison.

Table 5.1
Variables Included in Propensity Score Weighting Model

Variable	Definition
Wife's education	Less than high school or GED Completed high school diploma or GED, no college Some college, no bachelor's degree Bachelor's degree, no graduate school Graduate of professional school
Wife's age	16–21 years 22–26 years 27–31 years 32–36 years 37–41 years 42–46 years 47–51 years 52–56 years 57–61 years 62–65 years
Wife's race	White (non-Hispanic) African American (non-Hispanic) Hispanic Other
Parental status	Has children under 6 at home
Citizenship status	U.S. citizen
Potential experience	Age minus years of education minus 5
Squared potential experience	Potential labor market experience squared
Recent move	Moved in past year
Region	Northeast Midwest South West

The doubly robust analysis removes all of these differences so that the "look-alike" civilians are similar to the military wives in age, citizenship, race, education, parental status, experience, recent moving, and region of the United States. The following results summarize the comparisons between military wives and "look-alike" civilian wives.

Table 5.2
Comparison of Military and Civilian Wife Characteristics

Variable	Civilian Wives (%)	Military Wives (%)
No high school/GED	10	3
High school/GED	29	18
Some college	28	51
College degree	23	22
Graduate school	10	7
16–21 years	1	7
22–26 years	7	22
27–31 years	12	24
32–36 years	15	20
37–41 years	15	15
42–46 years	16	8
47–51 years	14	3
52–56 years	10	1
57–61 years	7	0
62–65 years	2	0
Non-Hispanic white	69	66
Non-Hispanic black	8	12
Hispanic	15	12
Other	8	10
Has children	28	24
U.S. citizen	88	94
Potential experience	22.8	12.8
Moved within past year	10	98
Northeast	18	5
Midwest	23	9
South	36	56
West	23	30

Estimated Differences Between Military and Civilian Wives

Table 5.3 shows the results from the doubly robust estimation. The values in the table are the estimated differences between the fraction of military wives and look-alike civilian wives in the respective LUF labor force position categories for each military service.

After controlling for observable differences between the two groups, we found that military wives are more likely to be NILF, involuntarily part-time employed, and underemployed by mismatch. Military wives are less likely to be voluntarily part-time employed and adequately full-time employed. The following sections summarize these results in more detail.

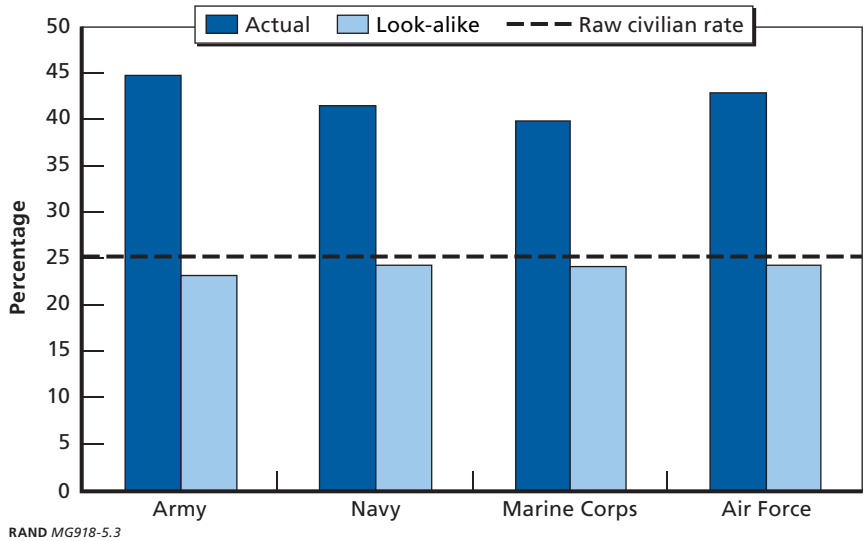
NILF Status

The raw comparison suggested that military wives are much more likely to be NILF than their civilian counterparts. This result holds after rigorously controlling for differences in individual characteristics. If anything, the difference between the two groups is slightly larger *after* controlling for other factors. Figure 5.3 compares military wives with similar civilian wives for each military service (with the dotted line

Table 5.3
Difference Between Military Wives and Look-Alike Civilian Wives, by Service

LUF Category	Army	Navy	Marines	Air Force
NILF	0.216	0.172	0.157	0.186
Unemployed	0.023	−0.002	0.011	0.002
Part-time employed (involuntary)	0.020	0.019	0.033	0.034
Part-time employed (voluntary)	−0.078	−0.053	−0.066	−0.060
Low income	−0.012	−0.006	0.004	−0.009
Educational mismatch	0.175	0.203	0.188	0.168
Adequate full-time employed	−0.345	−0.333	−0.327	−0.322

Figure 5.3
Percentage Not in the Labor Force, Military and Look-Alike Civilian Wives

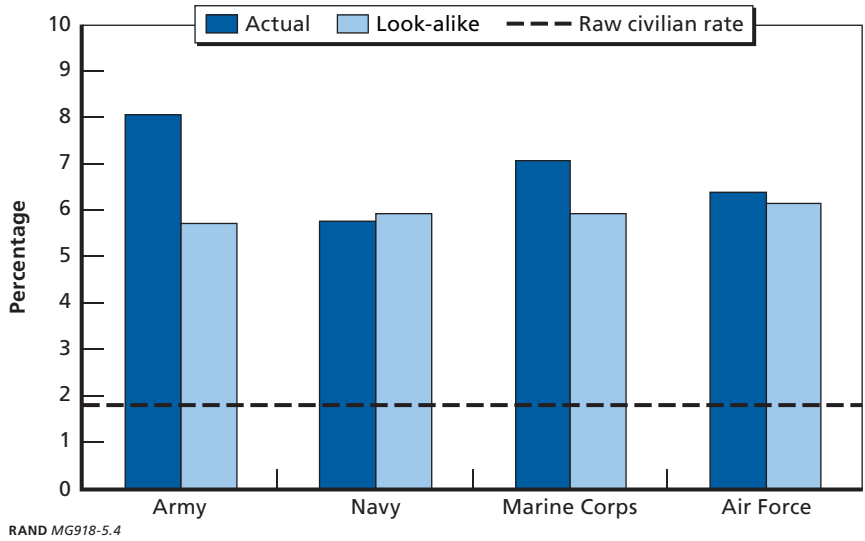


representing the raw civilian rate). Civilian wives who are weighted to match the wives of military members have about the same tendency to be NILF, which is consistently below the proportion of military wives in each service who are NILF.

Unemployment

Although military wives are much more likely to be NILF than comparable civilians, the analogous comparison for unemployment reveals almost no difference between military and civilian wives. Figure 5.4 compares the unemployment rates of military wives in each service with look-alike civilian wives. In all cases, the weighted civilian wives are much more likely to be unemployed than the unweighted civilian wives, suggesting that most of the gap in the raw comparison was due to other factors that the weighting controlled for. Army and Marine Corps wives are slightly more likely to be unemployed, and there is almost no difference between Navy and Air Force wives and similar civilian wives.

Figure 5.4
Percentage Unemployed, Military and Look-Alike Civilian Wives



Part-Time Work

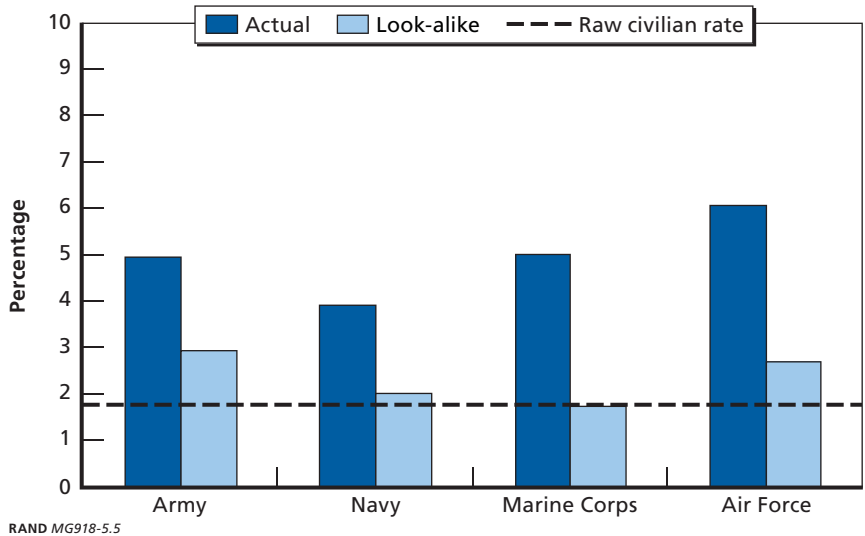
The raw comparisons suggested that military wives are more likely to work part-time involuntarily (i.e., because full-time work is unavailable) and less likely to voluntarily work part-time than civilian wives. Both these relationships hold for look-alike civilian spouses as well, although the differences are smaller for Army and Air Force wives than the raw numbers suggest. Figure 5.5 shows that military wives in all services are more likely to work part-time involuntarily than comparable civilian wives.

Figure 5.6 shows the same comparison for voluntary part-time employment. Military wives are less likely than comparable civilian wives to work part-time voluntarily; in every case, however, the difference is smaller than the raw comparison suggests.

Underemployment by Low Income

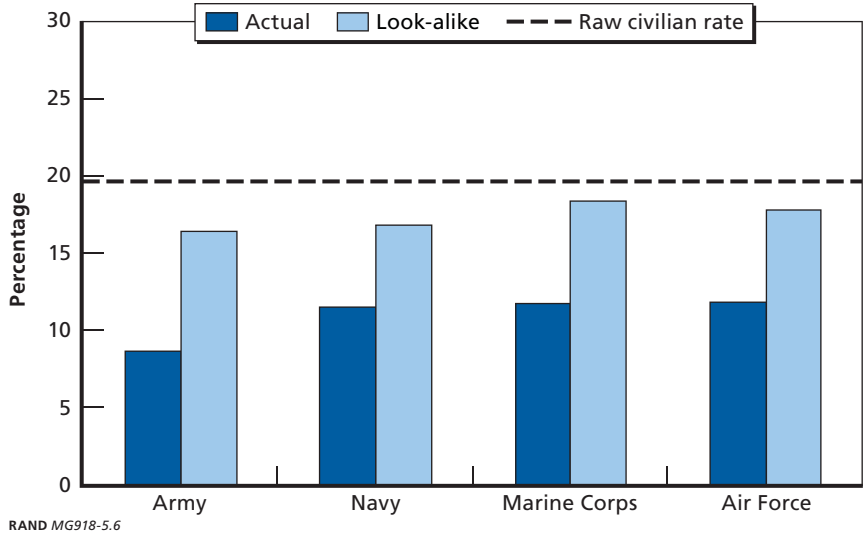
Figure 5.7 shows the percentage of military and look-alike spouses who are underemployed by low income for each service. All but Marine

Figure 5.5
Percentage Working Part-Time Involuntarily, Military and Look-Alike Civilian Wives



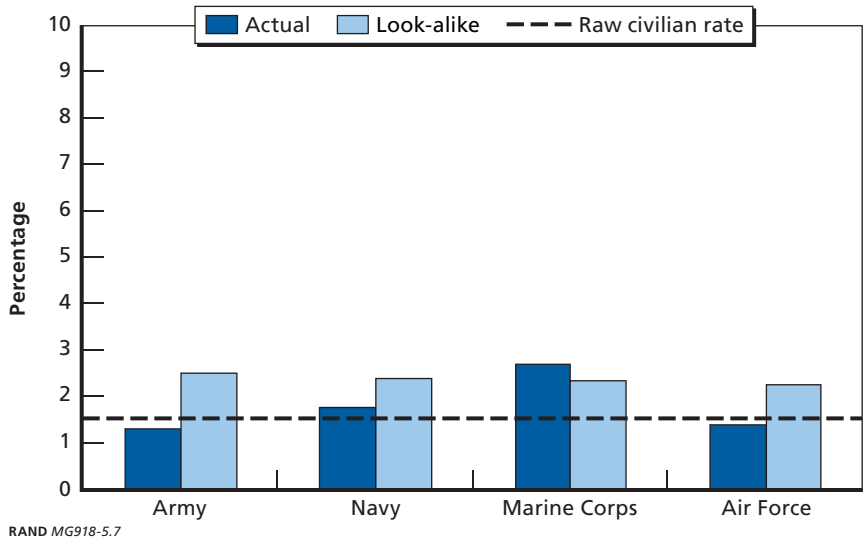
RAND *MG918-5.5*

Figure 5.6
Percentage Working Part-Time Voluntarily, Military and Look-Alike Civilian Wives



RAND *MG918-5.6*

Figure 5.7
Percentage Underemployed by Low Income, Military and Look-Alike Civilian Wives



Corps wives are slightly less likely than similar civilian wives to be underemployed by low income. After controlling for observable characteristics, we found that this difference is slightly larger for Army, Navy, and Air Force wives than the raw numbers would suggest. For Marine Corps wives, the raw comparison suggests that they have a higher tendency to be in this category, but the look-alike comparison shows that observable characteristics explain most of this difference.

Underemployed by Educational Mismatch

The data have consistently shown that military spouses have a tendency to be underemployed by educational mismatch. The look-alike comparison confirms that military wives are more likely than civilian wives to fall into this category, and in each case the gap is bigger than the unadjusted comparisons suggest. The proportion of military wives who are underemployed by educational mismatch is over 20 percent in each service, while the proportion of comparable civilian wives in this cat-

egory ranges from 2 to 4 percent. Figure 5.8 summarizes the results of this comparison.

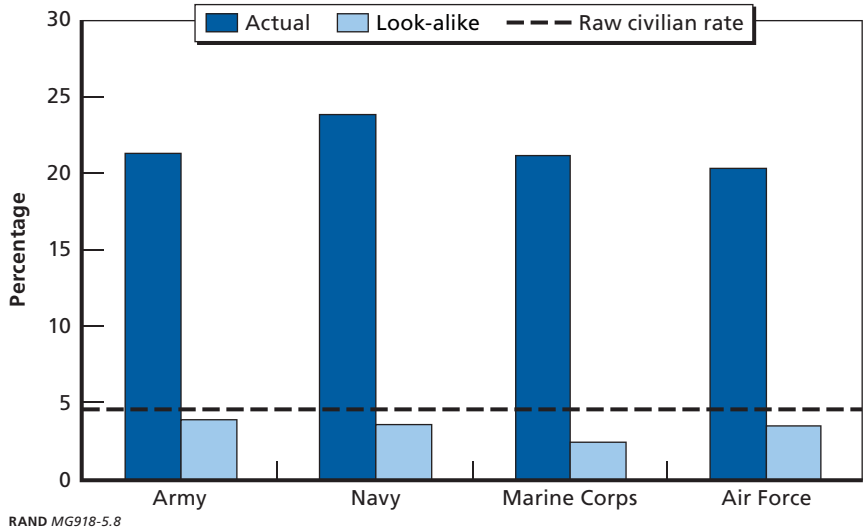
Adequate Full-Time Employment

Finally, Figure 5.9 shows that military wives are indeed much less likely than similar civilian wives to be adequately full-time employed. The proportion of civilian wives who are adequately full-time employed hardly changes after weighting, and the gap of about 35 percent holds across all services.

Summary

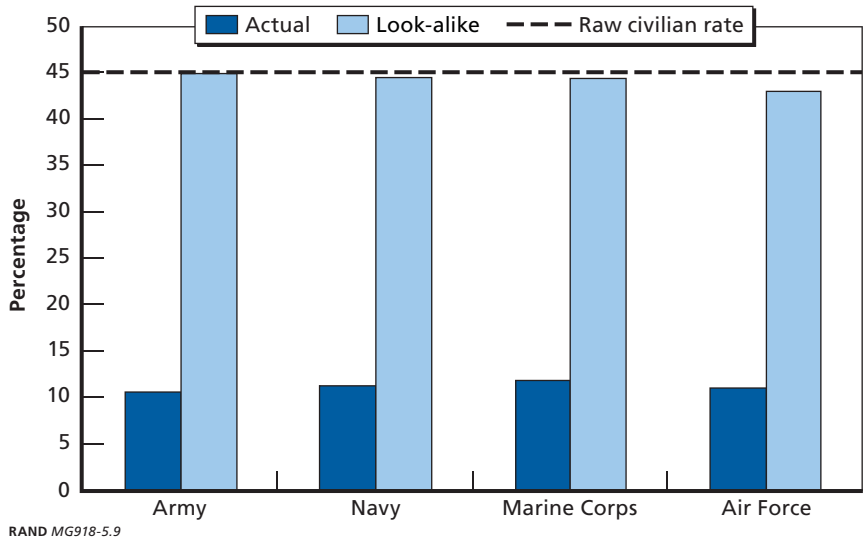
Simple comparisons suggest that military wives are more likely than civilian wives to be underemployed. Still, military wives differ from

Figure 5.8
Percentage with Educational Mismatch, Military and Look-Alike Civilian Wives



RAND *MG918-5.8*

Figure 5.9
Percentage Adequately Full-Time Employed, Military and Look-Alike Civilian Wives



civilian wives on many observable dimensions. Thus, one might worry that differences in employment are partly attributable to differences in age, experience, family situation, etc.

This chapter shows that the relative underemployment of military wives (compared with civilian wives) holds after controlling for individual characteristics that may relate to employment. Only in the case of unemployment was the gap between military and civilian wives mostly attributable to individual characteristics.

Finally, this chapter serves as another illustration of the usefulness of LUF labor force position categories in monitoring employment conditions for military wives, because the construction of LUF categories permits analysis of the subtle differences between military and civilian wives. For example, military wives tend to have high levels of education relative to others in their career field while this is not the case for similar civilian wives. Continued collection of these data would permit policymakers to monitor this tendency over time and would add additional insight to any policy discussions regarding military spouse employment.

CHAPTER SIX

Labor Market Conditions and the Satisfaction of Military Wives

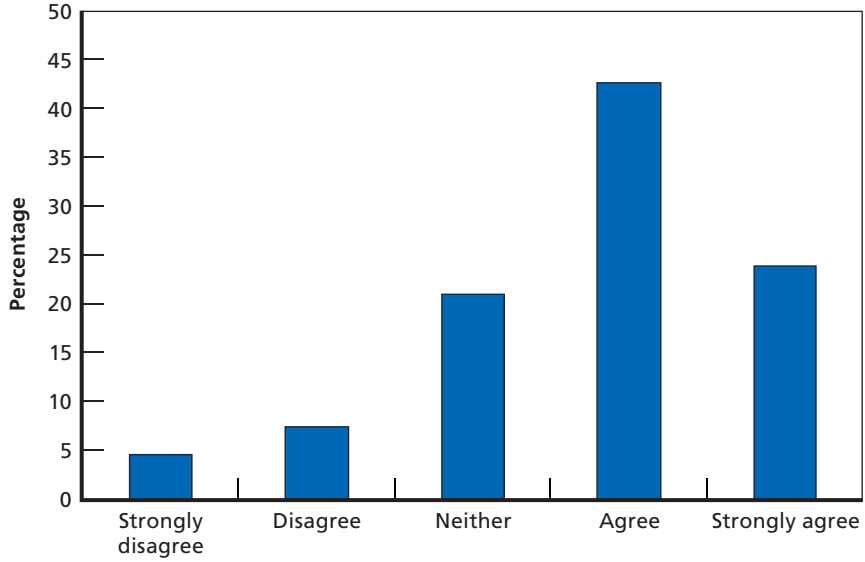
In Chapter One, we noted that our analysis of military wives' labor market opportunities was motivated by previous work that identified a relationship between employment and well-being. This chapter examines whether this supposed relationship is borne out in the DMDC survey data. Specifically, if underemployment decreases well-being, then we should observe a statistical correlation between underemployment among military wives and their individual well-being.

Unfortunately, individual well-being is difficult to measure, and there are no quantitative well-being or health metrics in this dataset. There are, however, several survey questions that probe individual satisfaction. Satisfaction and well-being are not the same thing, but satisfaction may serve as a useful and illustrative proxy for well-being. Furthermore, the relationship between military wives' employment conditions and their life satisfaction may be valuable in its own right, since wives' dissatisfaction may translate into higher service member attrition from military service.

The primary outcome of interest in this chapter is a military wife's level of agreement with the statement: "Generally, on a day-to-day basis, I am happy with my life as a military spouse."[1] Figure 6.1 summarizes the survey responses to this question.

[1] Survey respondents indicated their level of agreement as one of the following five choices: strongly agree, agree, neither agree nor disagree, disagree, strongly disagree.

Figure 6.1
Survey Responses to "Generally, on a Day-to-Day Basis, I Am Happy with My Life as a Military Spouse"



RAND *MG918-6.1*

Ordered Logistic Regression

Survey respondents' answers indicated their level of agreement on an ordered scale, but there is not necessarily any quantitative value to the differences between the response categories. Therefore, standard regression analysis on this type of outcome would be inappropriate, because it would essentially assume that the difference between "strongly disagree" and "disagree" is the same as the difference between "neither" and "agree." An ordered logistic regression model accounts for the fact that there is no quantitative value to the categories while still exploiting the fact that the categories do follow a natural order.

Similar to the MNL regression, the ordered logistic regression relates the probability of each level of agreement to a function of the individual characteristics of interest. In this chapter, we are primarily interested in the effect of a wife's LUF labor force position category

on their probability of agreeing with the survey question.[2] Figure 6.2 illustrates how the survey responses varied with the LUF category of the respondent. A plurality of wives in each category agreed with the statement. The proportion that either disagreed or strongly disagreed was higher among wives in the subunemployed category and slightly higher in the involuntarily part-time employed and underemployed by low-income categories. The proportion of wives who strongly agreed was roughly the same across LUF categories, with the exception of the subunemployed category.

Average Marginal Effects

We next present the average marginal effect of each variable on the probability of agreeing with the statement (that is, choosing either "agree" or "strongly agree").[3] As described in Chapter Four, the average marginal effect is the average change in the probability of a given outcome that is associated with a change in the variable of interest.

Figure 6.3 shows the average marginal effect of being in each LUF category on the probability of agreeing with the survey state-

[2] As before, the ordered logistic regression assumes that the random term follows a type-1 extreme value (Gumbel) distribution. This allows the probability that individual *i* chooses a level of agreement *j* to be written as

$$\Pr\left(Y_i = j \mid x_i\right) = \frac{e^{\left(cutoff_j - x_i'\beta\right)}}{1 + e^{\left(cutoff_j - x_i'\beta\right)}} - \frac{e^{\left(cutoff_{j-1} - x_i'\beta\right)}}{1 + e^{\left(cutoff_{j-1} - x_i'\beta\right)}},$$

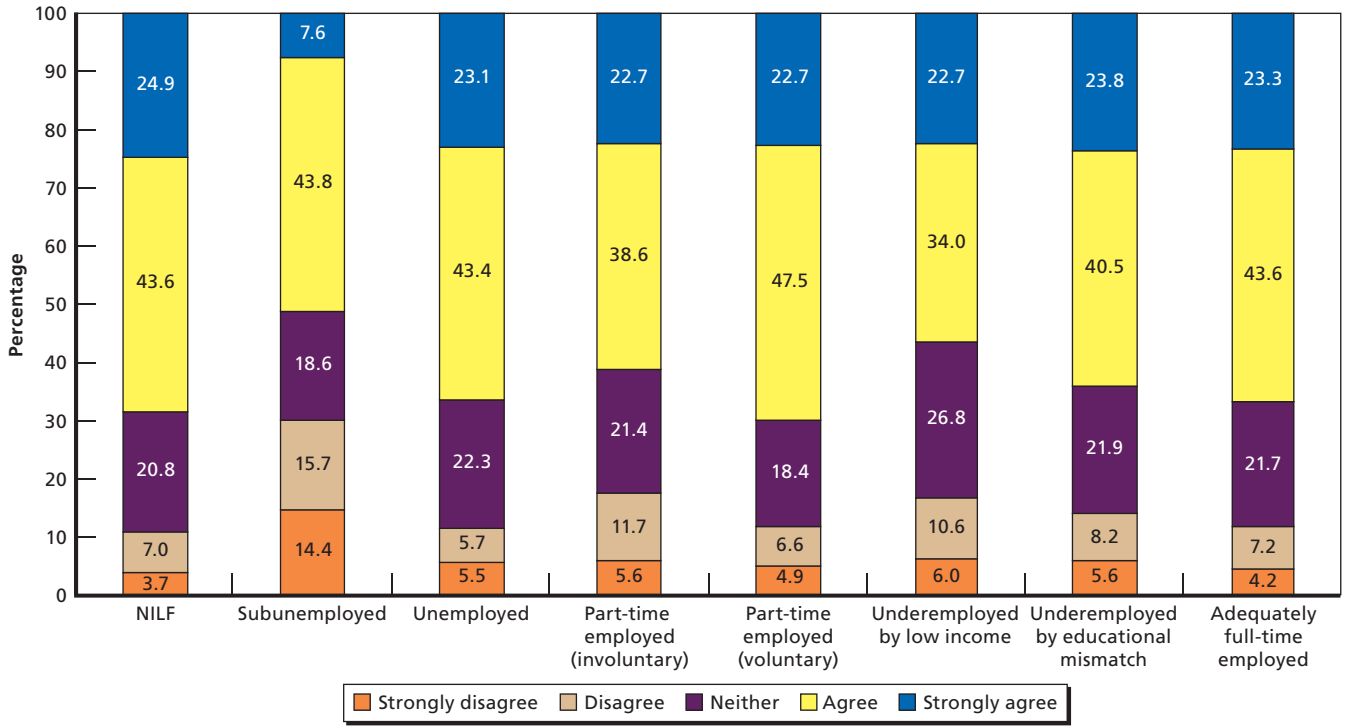
for *j* = strongly disagree, … , strongly agree. Intuitively, if a person chooses "agree," it means their utility was lower than the cutoff for "strongly agree, but higher than the cutoff for "neither." This formula expresses the probability that an individual's utility is in the "range" for a given category.

[3] Using this formula, the marginal effect of labor force position, *x*, on the probability of agreeing is

$$\frac{\partial P_{agree}}{\partial x_i} = \frac{e^{\left(cutoff_{agree} - x_i'\beta\right)}}{1 + e^{\left(cutoff_{agree} - x_i'\beta\right)}} \times \beta.$$

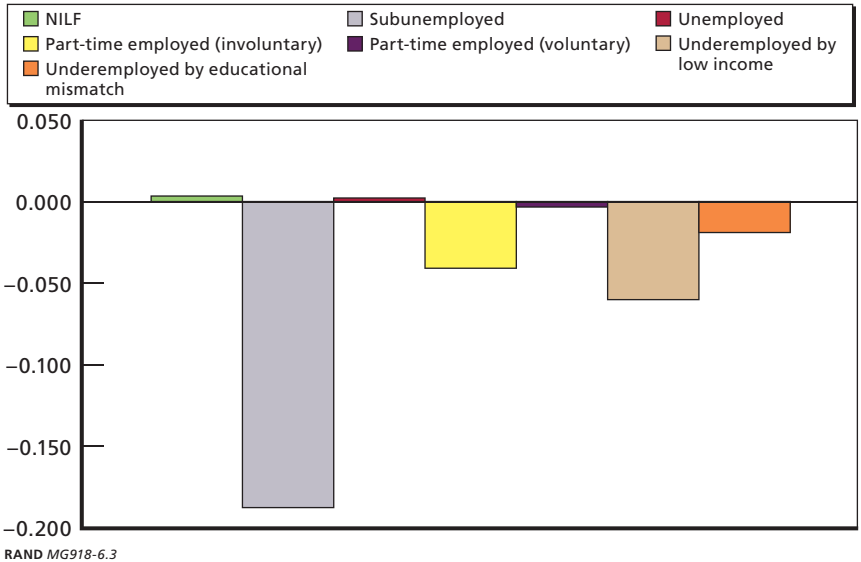
We calculate this effect for each person in the dataset and then average it over everyone to obtain the average marginal effect.

Figure 6.2
Survey Responses by LUF Labor Force Position Category



RAND *MG918-6.2*

Figure 6.3
Average Marginal Effect of LUF Category on the Probability of Agreeing with the Survey Statement, Relative to Adequate Full-Time Employment



ment, relative to those who were adequately full-time employed. With the exception of the subunemployed, all of these average marginal effects are small and statistically insignificant.[4] Furthermore, because of the small number of people in the subunemployed category, the estimate of the average marginal effect is very imprecise. Although subunemployed wives were 19 percent less likely than adequately full-time employed wives to agree or strongly agree, the 95 percent confidence interval for this average marginal effect includes values as small as –0.36 and as large as –0.02. Furthermore, as indicated previously, it would be questionable to conclude that being subunemployed has a causal effect on life satisfaction, given that those in the subunemployed category are, by definition, "discouraged."[5]

[4] Statistical significance and confidence intervals were calculated using the nonparametric bootstrap method.

[5] The model portrayed in Figure 6.3 includes controls for husband's service, husband's pay grade, and if the wife indicated that pursuing a career was a personal goal. We experimented

Summary

Previous research with the civilian population found a link between underemployment and individual well-being—a link that partially motivated this analysis of military wives' labor market opportunities. Still, there does not appear to be a strong link between wives' labor force position and satisfaction with their life situation. This result may indicate that, if the policy focus is upon individual well-being, underemployment among military spouses is not as serious a problem as previously thought.

There are several reasons that we may not observe a strong relationship between employment and well-being in this context. It could be the case that other factors besides employment are more important determinants of military wives' happiness. In addition, a survey response expressing the degree of agreement with a statement is a less-than-ideal measure of individual well-being. Employment opportunities could affect military wives' well-being in other ways that are not detected by such a crude measure.

Military wives may be more willing to accept underemployment than the average woman in the labor force. Women who choose to marry military members may have different goals and different expectations that explain the lack of relationship between employment opportunities and life satisfaction. Still, previous work has not found a robust relationship between LUF measures of underemployment and life satisfaction. For example, Friedland and Price (2003) used nationally representative data to examine the relationship between underemployment and measures of physical and psychological well-being. They concluded that there is "only moderate support" for the proposed relationship between LUF measures of underemployment and well-being. They found only unemployment to be significantly related to life satisfaction, whereas indicator variables for low hours, low income, and educational mismatch were all insignificant.

---

with interactions between employment and career goals (for example, we tested if there was an effect of being unemployed *and* wanting a career on happiness), but the interactions did not yield any additional insight.

Friedland and Price took advantage of panel data and were able to control for initial health conditions.[6] At the same time, they acknowledged that "failure to control for previous levels of health and well-being will lead researchers to overestimate the effects of different types of underemployment on health and well-being." Our analysis was unable to find even a cross-sectional correlation between underemployment and well-being, which could still be noteworthy. At this point, whether this lack of a relationship expresses an underlying difference between military wives and civilian wives is unclear.

---

6 *Panel data* consist of repeat observations on individuals over time.

CHAPTER SEVEN

Conclusion and Policy Implications

In order to inform discussion of employment conditions for military spouses, DoD needs more accurate measures. In previous work, Lim and Golinelli (2006) stated the shortcomings of standard BLS employment measures and recommended that DoD consider using LUF labor force behavior and labor force position indicators to monitor aggregate spouse employment. In this study, we have shown, using existing DMDC data, that DoD can gain useful insight from LUF labor force position indicators.[1]

This analysis yields a number of useful policy insights. First, there is a large tendency for military wives to be not in the labor force (NILF)—jobless and not looking for work. This tendency is not driven by any kind of discouragement at lack of opportunity, because the subunemployed category is less than 1 percent of the military wife population. The tendency to be NILF does appear to be strongly related to husband's pay grade and family responsibilities (i.e., children). This result suggests that improved child care may be one way to help these wives, if they do want to work. DoD could use additional survey questions to investigate why most wives do not look for work.

In addition, this analysis revealed other aspects of underemployment that DoD can use to inform policy decisions. Twenty-two percent of military wives have relatively high levels of education for their occupations, and the tendency for educational mismatch is greater among highly educated wives. This result could mean that military wives take

[1] Analysis of labor force behavior could be done with additional data collection.

jobs for which they are overqualified, that they attempt to make up for a lack of other qualifications (experience, for example) with additional education, or that they generally prefer less-demanding work. From these data, we cannot conclude which of these processes generates the tendency for educational mismatch. If DoD desires to do more to help these wives, specific survey questions addressing their job qualifications could further inform policy.

In spite of the underemployment realities among military spouses, underutilization in the labor market does not seem to be strongly related to a wife's satisfaction with life as a military spouse. Although DoD may wish to actively improve labor market opportunities for spouses to honor the social compact, wives who are currently underemployed do not seem overly dissatisfied (or at least they do not express dissatisfaction on surveys). Thus, the well-being of military spouses may not depend on their position on the labor market as much as theory and prior research would suggest, and the hypothesized attrition due to underemployment may not actually materialize.

Finally, we cannot conclude from these results whether the military lifestyle causes underemployment among military wives. The analysis cannot say *why* such a large portion of military wives are NILF relative to civilian wives. It could be that these wives would have a lesser tendency to work regardless of whether they had married a service member, and the lack of a relationship between well-being and underemployment is consistent with this hypothesis. Thus, it is unclear whether policies designed to improve their labor market prospects would be efficacious (or even desirable). Still, the fact that military wives do have a higher tendency to be involuntarily part-time employed relative to civilian wives suggests that this group has difficulty finding full-time work. The greater tendency of military wives to be relatively highly educated may suggest that they take work for which they are overqualified because better opportunities are not available.

Further research and additional survey questions could probe deeper into the counterfactual question: What would military wives do if they were not subject to the demands of the military lifestyle? Such questions are difficult to answer credibly, but they are critical to

DoD's efforts to honor their social compact and efficiently promote the well-being of military families with limited resources.

APPENDIX A

Profile of Military Wives and Their Civilian Counterparts

This appendix presents the individual and contextual characteristics of Army, Navy, Marine Corps, and Air Force wives and their civilian counterparts. The characteristics considered for this comparison are age, citizenship, race, education, likelihood of having children less than six years of age at home, experience, whether moved in the past year, and region.

The tables in this appendix list the proportions of military wives, civilian wives, and weighted (look-alike) civilian wives in each category. The numbers in the tables illustrate the similarity of the military wives and the look-alike civilians—and thus, the success of weighting in removing the influence of confounding variables.

Profile of Army Wives

Table A.1
Balanced Table for Army and Civilian Wives

Variable	Army Wives	Look-Alike Civilian Wives	Civilian Wives
Age category (%)			
16–21	5.0	4.5	1.3
22–26	21.5	22.3	6.8
27–31	25.2	23.7	11.9
32–36	20.8	21.4	14.6
37–41	15.6	16.5	15.5
42–46	7.8	7.5	16.3
47–51	2.8	2.8	14.0
52–56	1.1	1.1	10.3
57–61	0.3	0.3	7.0
62–65	0.0	0.1	2.5
Citizen (%)	93.1	93.7	88.2
Race (%)			
Non-Hispanic white	60.9	62.5	69.4
Non-Hispanic black	16.6	16.8	7.6
Hispanic	13.6	12.8	15.2
Other	8.9	7.9	7.9
Education (%)			
No high school diploma/GED	2.6	2.5	10.1
High school diploma/GED	17.8	18.1	28.6
Some college	51.2	50.9	28.5
Bachelor's degree	20.7	21.3	22.5
Graduate school	7.7	7.2	10.3

Table A.1—Continued

Variable	Army Wives	Look-Alike Civilian Wives	Civilian Wives
Children under 6 at home (%)	23.7	25.1	28.3
Experience (years)	13.0	13.0	23.0
Squared experience	224.0	226.0	639.0
Moved within past year (%)	98.0	98.0	10.0
Region (%)			
Northeast	6.0	5.7	17.8
Midwest	8.6	8.8	22.9
South	64.5	64.2	35.9
West	20.9	21.3	23.5

Profile of Navy Wives

Table A.2
Balanced Table for Navy and Civilian Wives

Variable	Navy Wives	Look-Alike Civilian Wives	Civilian Wives
Age category (%)			
16–21	7.2	6.4	1.3
22–26	20.1	20.6	6.8
27–31	22.2	21.2	11.9
32–36	21.9	23.2	14.6
37–41	15.1	15.0	15.5
42–46	8.7	8.4	16.3
47–51	3.9	4.0	14.0
52–56	0.8	0.8	10.3
57–61	0.1	0.3	7.0
62–65	0.1	0.1	2.5
Citizen (%)	92.6	93.1	88.2
Race (%)			
Non-Hispanic white	62.4	63.2	69.4
Non-Hispanic black	11.7	11.1	7.6
Hispanic	11.4	9.9	15.2
Other	14.6	15.9	7.9
Education (%)			
No high school diploma/GED	3.4	3.1	10.1
High school diploma/GED	18.0	18.5	28.6
Some college	50.3	50.3	28.5
Bachelor's degree	21.0	21.6	22.5
Graduate school	7.3	6.6	10.3

Table A.2—Continued

Variable	Navy Wives	Look-Alike Civilian Wives	Civilian Wives
Children under 6 at home	23.6	25.0	28.3
Experience (years)	13.2	13.2	22.8
Squared experience	234.1	236.7	638.8
Moved within past year (%)	98.0	98.0	10.0
Region (%)			
Northeast	6.6	6.0	17.8
Midwest	5.3	5.5	22.9
South	52.5	51.8	35.9
West	35.7	36.7	23.5

Profile of Marine Corps Wives

Table A.3
Balanced Table for Marine Corps and Civilian Wives

Variable	Marine Corps Wives	Look-Alike Civilian Wives	Civilian Wives
Age category (%)			
16–21	13.9	12.7	1.3
22–26	33.2	33.9	6.8
27–31	21.3	21.6	11.9
32–36	15.1	15.1	14.6
37–41	9.9	10.1	15.5
42–46	4.4	4.2	16.3
47–51	1.8	1.9	14.0
52–56	0.2	0.4	10.3
57–61	0.1	0.3	7.0
62–65	0.0	0.1	2.5
Citizen (%)	94.9	95.2	88.2
Race (%)			
Non-Hispanic white	66.2	68.0	69.4
Non-Hispanic black	8.8	7.9	7.6
Hispanic	16.4	16.2	15.2
Other	8.6	7.8	7.9
Education (%)			
No high school diploma/GED	2.5	2.5	10.1
High school diploma/GED	18.9	19.8	28.6
Some college	52.3	51.8	28.5
Bachelor's degree	20.3	20.7	22.5
Graduate school	6.0	5.2	10.3

Table A.3—Continued

Variable	Marine Corps Wives	Look-Alike Civilian Wives	Civilian Wives
Children under 6 at home (%)	26.8	26.1	28.3
Experience (years)	10.0	10.0	23.0
Squared experience	148.0	151.0	639.0
Moved within past year (%)	99.0	99.0	10.0
Region (%)			
Northeast	3.8	3.5	17.8
Midwest	5.5	5.7	22.9
South	52.8	52.3	35.9
West	38.0	38.5	23.5

Profile of Air Force Wives

Table A.4
Balanced Table for Air Force and Civilian Wives

Variable	Air Force Wives	Look-Alike Civilian Wives	Civilian Wives
Age category (%)			
16–21	5.1	4.4	1.3
22–26	19.9	20.0	6.8
27–31	24.4	24.7	11.9
32–36	18.7	18.8	14.6
37–41	17.3	17.4	15.5
42–46	9.9	9.6	16.3
47–51	3.4	3.6	14.0
52–56	1.2	1.2	10.3
57–61	0.1	0.2	7.0
62–65	0.0	0.1	2.5
Citizen (%)	94.5	94.7	88.2
Race (%)			
Non-Hispanic white	75.2	75.9	69.4
Non-Hispanic black	7.6	7.1	7.6
Hispanic	9.1	8.8	15.2
Other	8.1	8.2	7.9
Education (%)			
No high school diploma/GED	2.3	2.2	10.1
High school diploma/GED	16.0	16.0	28.6
Some college	49.2	49.9	28.5
Bachelor's degree	24.8	25.0	22.5
Graduate school	7.6	6.8	10.3

Table A.4—Continued

Variable	Air Force Wives	Look-Alike Civilian Wives	Civilian Wives
Children under 6 at home (%)	24.8	25.5	28.3
Experience (years)	13.0	13.0	23.0
Squared experience	241.0	241.0	639.0
Moved within past year (%)	99.0	99.0	10.0
Region (%)			
Northeast	3.2	3.0	17.8
Midwest	14.1	14.4	22.9
South	51.5	51.1	35.9
West	31.2	31.6	23.5

APPENDIX B

Multinomial Logistic Regression Results

This appendix includes the full set of average marginal effects from the multinomial logistic regression, as well as detailed statistics on each. Table B.1 is sorted by statistical significance, then LUF category, then variable.

Table B.1
Multinomial Logistic Regression Results: Average Marginal Effects, Standard Errors, and Confidence Intervals

LUF Category	Variable	Average Marginal Effect	Bootstrap Standard Error	95% Confidence Interval		Significance Level
NILF	E5–E9	0.132	0.042	0.051	0.214	1%
NILF	W1–W5	0.355	0.081	0.195	0.514	1%
NILF	O1–O3	0.551	0.058	0.437	0.665	1%
NILF	O4–O6	0.740	0.072	0.600	0.881	1%
NILF	Black	–0.304	0.057	–0.416	–0.193	1%
NILF	Some college	–0.379	0.122	–0.617	–0.140	1%
NILF	College degree	–0.575	0.125	–0.820	–0.330	1%
NILF	Civ rent	–0.152	0.043	–0.237	–0.067	1%
NILF	Civ own	–0.334	0.045	–0.423	–0.245	1%
NILF	Children	0.495	0.043	0.410	0.581	1%
NILF	Citizen	–0.222	0.069	–0.358	–0.086	1%

Table B.1—Continued

LUF Category	Variable	Average Marginal Effect	Bootstrap Standard Error	95% Confidence Interval		Significance Level
UNEMP	Black	0.051	0.011	0.030	0.072	1%
UNEMP	Other	0.035	0.013	0.010	0.059	1%
PTINVOL	O4–O6	–0.038	0.014	–0.065	–0.011	1%
PTINVOL	West	–0.037	0.012	–0.061	–0.013	1%
PTINVOL	Children	–0.031	0.008	–0.047	–0.014	1%
PTVOL	O4–O6	0.070	0.023	0.024	0.116	1%
PTVOL	Other	–0.058	0.018	–0.094	–0.023	1%
PTVOL	Grad school	0.136	0.052	0.034	0.238	1%
EDUCMIS	O1–O3	–0.146	0.031	-0.206	-0.085	1%
EDUCMIS	O4–O6	-0.175	0.036	-0.245	-0.106	1%
EDUCMIS	Hispanic	0.084	0.024	0.037	0.130	1%
EDUCMIS	Grad school	0.576	0.085	0.409	0.743	1%
EDUCMIS	Children	–0.109	0.022	–0.153	–0.065	1%
ADFT	O1–O3	–0.065	0.017	–0.098	–0.033	1%
ADFT	O4–O6	–0.114	0.021	–0.154	–0.074	1%
ADFT	Black	0.040	0.013	0.014	0.066	1%
ADFT	Hispanic	–0.037	0.012	–0.062	–0.013	1%
ADFT	Civ rent	0.034	0.012	0.010	0.059	1%
ADFT	Civ own	0.069	0.013	0.045	0.094	1%
ADFT	Children	–0.069	0.012	–0.093	–0.044	1%
NILF	Marines	–0.085	0.040	–0.163	–0.007	5%
NILF	Hispanic	0.095	0.047	0.004	0.186	5%
NILF	Military off base	0.164	0.068	0.032	0.297	5%
NILF	West	–0.199	0.081	–0.357	–0.040	5%

Table B.1—Continued

LUF Category	Variable	Average Marginal Effect	Bootstrap Standard Error	95% Confidence Interval		Significance Level
UNEMP	Navy	−0.023	0.009	−0.040	−0.005	5%
UNEMP	E5–E9	−0.019	0.009	−0.037	−0.001	5%
UNEMP	Hispanic	0.027	0.011	0.007	0.048	5%
UNEMP	Some college	−0.038	0.018	−0.075	−0.002	5%
PTINVOL	E5–E9	−0.017	0.008	−0.034	−0.001	5%
PTINVOL	Grad school	0.088	0.039	0.012	0.164	5%
PTINVOL	Civ own	−0.019	0.009	−0.036	−0.002	5%
PTINVOL	South	−0.025	0.011	−0.047	−0.003	5%
PTINVOL	Experience	−0.001	0.001	−0.003	0.000	5%
PTVOL	Navy	0.032	0.015	0.002	0.062	5%
PTVOL	Marines	0.034	0.016	0.003	0.065	5%
PTVOL	Civ own	0.032	0.013	0.008	0.057	5%
PTVOL	Experience	−0.002	0.001	−0.003	0.000	5%
EDUCMIS	Black	0.066	0.029	0.009	0.122	5%
ADFT	W1–W5	−0.055	0.023	−0.100	−0.011	5%
ADFT	Grad school	−0.152	0.059	−0.268	−0.036	5%
ADFT	West	0.063	0.027	0.011	0.115	5%
ADFT	Citizen	0.046	0.021	0.006	0.087	5%
NILF	Other	0.091	0.052	−0.010	0.193	10%
NILF	HS	−0.229	0.126	−0.476	0.017	10%
NILF	Grad school	−0.310	0.175	−0.652	0.032	10%
NILF	South	−0.137	0.079	−0.293	0.018	10%
UNEMP	College degree	−0.034	0.020	−0.073	0.004	10%
UNEMP	Civ own	−0.020	0.010	−0.040	0.001	10%
PTINVOL	Citizen	−0.020	0.012	−0.043	0.003	10%

Table B.1—Continued

LUF Category	Variable	Average Marginal Effect	Bootstrap Standard Error	95% Confidence Interval		Significance Level
PTVOL	Air Force	0.030	0.016	−0.002	0.061	10%
PTVOL	Hispanic	−0.032	0.017	−0.067	0.002	10%
PTVOL	Moved	0.102	0.052	0.000	0.203	10%
EDUCMIS	W1–W5	−0.087	0.047	−0.179	0.005	10%
EDUCMIS	College degree	0.124	0.066	−0.006	0.255	10%
ADFT	Military off base	−0.040	0.022	−0.082	0.002	10%
NILF	Navy	−0.035	0.041	−0.116	0.046	NO
NILF	Air Force	−0.046	0.042	−0.130	0.037	NO
NILF	Midwest	−0.099	0.092	−0.280	0.082	NO
NILF	Experience	0.000	0.003	−0.005	0.005	NO
NILF	Moved	−0.122	0.156	−0.427	0.183	NO
NILF	Deployed	0.048	0.034	−0.020	0.115	NO
UNEMP	Marines	−0.008	0.009	−0.026	0.010	NO
UNEMP	Air Force	−0.012	0.010	−0.031	0.008	NO
UNEMP	W1–W5	−0.004	0.018	−0.040	0.032	NO
UNEMP	O1–O3	−0.023	0.015	−0.051	0.006	NO
UNEMP	O4–O6	−0.017	0.015	−0.047	0.014	NO
UNEMP	HS	−0.018	0.019	−0.056	0.020	NO
UNEMP	Grad school	−0.002	0.024	−0.049	0.045	NO
UNEMP	Military off base	0.018	0.014	−0.009	0.045	NO
UNEMP	Civ rent	0.010	0.010	−0.009	0.029	NO
UNEMP	Midwest	0.001	0.020	−0.037	0.040	NO
UNEMP	South	−0.007	0.016	−0.039	0.025	NO
UNEMP	West	−0.022	0.017	−0.055	0.011	NO

Table B.1—Continued

LUF Category	Variable	Average Marginal Effect	Bootstrap Standard Error	95% Confidence Interval		Significance Level
UNEMP	Children	–0.007	0.008	–0.023	0.010	NO
UNEMP	Citizen	0.006	0.015	–0.024	0.037	NO
UNEMP	Experience	0.000	0.001	–0.001	0.001	NO
UNEMP	Moved	0.024	0.039	–0.052	0.100	NO
UNEMP	Deployed	0.002	0.009	–0.015	0.019	NO
PTINVOL	Navy	–0.008	0.010	–0.027	0.011	NO
PTINVOL	Marines	0.003	0.009	–0.016	0.021	NO
PTINVOL	Air Force	0.009	0.009	–0.008	0.027	NO
PTINVOL	W1–W5	–0.002	0.016	–0.034	0.030	NO
PTINVOL	O1–O3	–0.012	0.011	–0.033	0.009	NO
PTINVOL	Black	–0.009	0.013	–0.034	0.015	NO
PTINVOL	Hispanic	–0.013	0.010	–0.033	0.008	NO
PTINVOL	Other	0.010	0.011	–0.012	0.031	NO
PTINVOL	HS	0.051	0.037	–0.021	0.123	NO
PTINVOL	Some college	0.048	0.036	–0.023	0.119	NO
PTINVOL	College degree	0.054	0.036	–0.017	0.124	NO
PTINVOL	Military off base	0.010	0.012	–0.013	0.034	NO
PTINVOL	Civ rent	–0.009	0.008	–0.025	0.006	NO
PTINVOL	Midwest	–0.006	0.014	–0.033	0.021	NO
PTINVOL	Moved	0.022	0.099	–0.173	0.217	NO
PTINVOL	Deployed	0.000	0.007	–0.014	0.014	NO
PTVOL	E5–E9	–0.011	0.015	–0.040	0.018	NO
PTVOL	W1–W5	0.016	0.027	–0.036	0.069	NO
PTVOL	O1–O3	–0.007	0.018	–0.042	0.028	NO

Table B.1—Continued

LUF Category	Variable	Average Marginal Effect	Bootstrap Standard Error	95% Confidence Interval		Significance Level
PTVOL	Black	–0.018	0.021	–0.058	0.022	NO
PTVOL	HS	0.057	0.048	–0.037	0.151	NO
PTVOL	Some college	0.071	0.047	–0.022	0.163	NO
PTVOL	College degree	0.074	0.049	–0.021	0.170	NO
PTVOL	Military off base	0.019	0.027	–0.033	0.072	NO
PTVOL	Civ rent	0.008	0.014	–0.021	0.036	NO
PTVOL	Midwest	0.014	0.031	–0.046	0.074	NO
PTVOL	South	–0.014	0.027	–0.068	0.039	NO
PTVOL	West	0.017	0.029	–0.039	0.073	NO
PTVOL	Children	0.014	0.013	–0.013	0.040	NO
PTVOL	Citizen	–0.025	0.023	–0.071	0.021	NO
PTVOL	Deployed	–0.004	0.012	–0.028	0.020	NO
EDUCMIS	Navy	0.031	0.020	–0.008	0.071	NO
EDUCMIS	Marines	0.000	0.022	–0.042	0.043	NO
EDUCMIS	Air Force	–0.004	0.023	–0.049	0.041	NO
EDUCMIS	E5–E9	–0.001	0.023	–0.046	0.043	NO
EDUCMIS	Other	–0.011	0.027	–0.064	0.043	NO
EDUCMIS	HS	0.002	0.067	–0.131	0.134	NO
EDUCMIS	Some college	–0.006	0.065	–0.133	0.121	NO
EDUCMIS	Military off base	–0.034	0.041	–0.114	0.046	NO
EDUCMIS	Civ rent	–0.018	0.024	–0.064	0.028	NO
EDUCMIS	Civ own	0.014	0.024	–0.033	0.062	NO
EDUCMIS	Midwest	0.003	0.051	–0.097	0.102	NO
EDUCMIS	South	0.013	0.042	–0.071	0.096	NO

Table B.1—Continued

LUF Category	Variable	Average Marginal Effect	Bootstrap Standard Error	95% Confidence Interval		Significance Level
EDUCMIS	West	–0.029	0.045	–0.117	0.059	NO
EDUCMIS	Citizen	0.046	0.035	–0.023	0.116	NO
EDUCMIS	Experience	0.001	0.001	–0.001	0.004	NO
EDUCMIS	Moved	–0.090	0.072	–0.231	0.051	NO
EDUCMIS	Deployed	0.011	0.018	–0.025	0.047	NO
ADFT	Navy	–0.001	0.012	–0.024	0.022	NO
ADFT	Marines	0.009	0.010	–0.010	0.029	NO
ADFT	Air Force	0.003	0.012	–0.021	0.026	NO
ADFT	E5–E9	–0.013	0.012	–0.037	0.011	NO
ADFT	Other	–0.013	0.015	–0.043	0.016	NO
ADFT	HS	0.021	0.041	–0.059	0.101	NO
ADFT	Some college	0.058	0.039	–0.019	0.135	NO
ADFT	College degree	0.061	0.040	–0.016	0.139	NO
ADFT	Midwest	0.018	0.029	–0.039	0.074	NO
ADFT	South	0.040	0.026	–0.010	0.091	NO
ADFT	Experience	0.001	0.001	–0.001	0.002	NO
ADFT	Moved	0.005	0.047	–0.086	0.097	NO
ADFT	Deployed	–0.012	0.009	–0.031	0.006	NO

APPENDIX C

Ordered Logistic Regression Results

This appendix includes the full set of average marginal effects from the ordered logistic regression in Chapter Six, along with detailed statistics.

Table C.1
Ordered Logistic Regression Results: Average Marginal Effects, Standard Errors, and Confidence Intervals

LUF Category	Average Marginal Effect	Bootstrap Standard Error	P–Value	95% Confidence Interval	
Adequate full-time (base)					
NILF	0.003	0.018	0.852	–0.031	0.038
Sub-unemployed	–0.188	0.088	0.032	–0.361	–0.016
Unemployed	0.002	0.024	0.939	–0.044	0.048
Part-time employed (involuntary)	–0.041	0.028	0.141	–0.096	0.014
Part-time employed (voluntary)	–0.003	0.019	0.862	–0.040	0.033
Underemployed by low income	–0.060	0.036	0.095	–0.131	0.011
Underemployed by education	–0.020	0.019	0.314	–0.058	0.019

APPENDIX D

Doubly Robust Estimation

Doubly robust (DR) estimation techniques use a combination of weighting and regression to control for confounding variables in the estimation of average treatment effects. This report uses DR estimation to control for nonrandom assignment of "treatment" status (also known as selection on observables). In this application, one can think of military wives as the "treatment" group and civilian wives as the "control" group. The DR estimation attempts to control for a wide range of relevant variables that relate to both treatment status and employment (age, experience, education, etc.). The following paragraphs summarize the techniques used in Chapter Five to perform the doubly robust weighted LUF labor force category comparisons.

The first step in this DR comparison is to compute a *propensity score* for each wife in the control group. An individual's propensity score is her probability of being in the treatment group, conditional on the observable characteristics. At first glance, a civilian wife's probability of being a military wife is nonsensical because the military and civilian wives come from two mutually exclusive data sources. In this type of analysis, then, propensity scores capture how similar a civilian wife is to the typical military wife. If we did not know which wives were which, a propensity score would be an appraisal of how likely each wife is to be a military wife given her characteristics. Those civilian wives who are most similar to the military wives would end up with the highest propensity scores.

Rosenbaum and Rubin (1983) show that adjusting for the propensity scores removes the confounding influence of the observable

characteristics. In other words, statistical analysis can compare observations in the treatment and control groups with similar propensity scores without fear of omitted variable bias. This important result leaves the analyst with two major decisions: how to compute the propensity scores, and how to adjust for them.

This analysis uses the generalized boosted model (GBM) technique to estimate the propensity scores, as endorsed by McCaffrey, Ridgeway, and Morral (2004). The GBM is an automated probability-predicting algorithm that experiments with flexible nonlinear functional forms (regression trees) to find the optimal model fit—as measured by the Bernoulli log-likelihood function. In addition, this analysis chooses the number of terms in the GBM model to maximize the balance between the weighted control group and the treatment group. More specifically, we choose the propensity scores that maximize the similarity between the distributions of observable characteristics in the two groups (Ridgeway and McCaffrey, 2007). Since the goal of propensity score analysis is to remove the influence of confounding differences between the groups, this attribute makes the GBM ideal for the weighted comparison described in Chapter Six.

Once the GBM computes the propensity scores, they can be used to weight observations in the control group when estimating the treatment effect (Hirano, Imbens, and Ridder, 2003). The goal of propensity weighting is for the weighted distribution of the observables in the control group to match the distribution in the treatment group, or

$$f(x \mid \textit{military}) = w(x) f(x \mid \textit{civilian}),$$

where x is the vector of observable characteristics. Solving this equation for $w(x)$ and applying Bayes theorem yields the following result:

$$w(x) = \left[\frac{f(t=1)}{f(t=0)}\right]\left[\frac{f(t=1 \mid x)}{1-f(t=1 \mid x)}\right].$$

The first term is constant (i.e., it does not depend on x) and will cancel in the weighted outcomes analysis. The second term is just the odds of being in the treatment group, conditional on x. Therefore, in

order to remove any difference in observable characteristics between the two groups, observations in the control group should receive a weight equal to

$$\frac{\Pr(\textit{military} \mid x)}{1 - \Pr(\textit{military} \mid x)}$$

(i.e., the odds of being a military spouse) (Ridgeway, 2006). Appendix A demonstrates the effectiveness of propensity weights in removing differences between the treatment and control groups. In each "balance table," stark differences between the treatment and unweighted control groups exist, but the weighted control group is nearly identical to the treatment group in each observable dimension. Thus, a simple weighted comparison of means would estimate the degree of underemployment among military spouses, controlling for observable characteristics.

Although the weighted comparison does attempt to control for the confounding variables, this report takes an additional step and performs a DR analysis with a weighted multinomial logistic regression. DR methods are superior to either the weighted comparison or the pure parametric regression because they remain consistent if either the propensity score model or the regression model is misspecified. DR methods are better than a parametric model, because the model must rely on arbitrary functional form to extrapolate in realms of the data where there is little similarity between the groups. Thus, a weighted regression in which the two groups are already similar will naturally be far less sensitive to the functional form. DR methods offer an advantage over a weighed comparison in that the weights may not fully remove all confounding differences between the two groups. When small differences remain after weighting, the regression controls will "catch" any remaining confounding influence.

Finally, it is important to stress that the DR method used in this report is not a solution to omitted variables bias. Any unobservable differences that correlate with being a military spouse and underemployment will bias the DR analysis just as any other technique would. Thus, DR analysis accounts only for variables in the model; it can still be confounded by variables that are omitted.

Bibliography

Bregger, J. E., and S. E. Haugen, "BLS Introduces New Range of Alternative Unemployment Measures," *Monthly Labor Review*, Vol. 118, No. 10, 1995, pp. 19–26.

Browning, M., A. Moller Dano, and E. Heinesen, "Job Displacement and Stress-Related Health Outcomes," *Health Economics*, Vol. 15, No. 10, 2006, pp. 1061–1075.

Clogg, C. C., *Measuring Underemployment: Demographic Indicators for the United States*, New York: Academic Press, 1979.

Clogg, C. C., S. R. Eliason, and K. T. Leicht, *Analyzing the Labor Force: Concepts, Measures, and Trends*, New York: Kluwer Academic/Plenum Publishers, 2001.

Clogg, C. C., S. R. Eliason, and R. Wahl, "Labor-Market Experiences and Labor-Force Outcomes," *American Journal of Sociology*, Vol. 95, 1990, 1536–1576.

Defense Manpower Data Center, "August 2004 Status of Forces Survey of Active-Duty Members: Administration, Datasets, and Codebook," DMDC Report No. 2004–016, August 2004.

DMDC—*see* Defense Manpower Data Center.

DoD—*see* U.S. Department of Defense.

Dooley, D., J. Fielding, and L. Levi, "Health and Unemployment," *Annual Review of Public Health*, Vol. 17, No. 1, 1996, pp. 449–465.

Dooley, D. and J. A. Prause, *The Social Costs of Underemployment: Inadequate Employment As Disguised Unemployment*, New York: Cambridge University Press, 2004.

———, "Birth Weight and Mothers' Adverse Employment Change," *Journal of Health and Social Behavior*, Vol. 46, No. 2, 2005, pp. 141–155.

Dooley, D., J. Prause, and K. A. Ham-Rowbottom, "Underemployment and Depression: Longitudinal Relationships," *Journal of Health and Social Behavior*, Vol. 41, No. 4, 2000, pp. 421–436.

Friedland, D. S., and R. H. Price, "Underemployment: Consequences for the Health and Well-Being of Workers," *American Journal of Community Psychology*, Vol. 32, No. 1, 2003, pp. 33–45.

Grossman, A. S., "The Employment Situation for Military Wives," *Monthly Labor Review*, Vol. 104, February 1981, pp. 60–64.

Harrell, Margaret C., Nelson Lim, Laura Werber Castaneda, and Daniela Golinelli, *Working Around the Military: Challenges to Military Spouse Employment and Education*, Santa Monica, Calif.: RAND Corporation, MG-196-OSD, 2004. As of September 15, 2009:
http://www.rand.org/pubs/monographs/MG196/

Hauser, P. M., "The Measurement of Labour Utilization," reprinted from *Malayan Economic Review*, Vol. 19, No. 1, April 1974, pp. 1–15, by the East–West Population Institute, Honolulu.

Hayghe, H. V., "Military and Civilian Wives: Update on the Labor Force Gap," *Monthly Labor Review*, Vol. 109, 1986.

Hirano, K., G. W. Imbens, and G. Ridder, "Efficient Estimation of Average Treatment Effects Using the Estimated Propensity Score," *Econometrica*, 2003, pp. 1161–1189.

Ho, Daniel, Kosuke Imai, Gary King, and Elizabeth Stuart, "Matching as Nonparametric Preprocessing for Reducing Model Dependence in Parametric Causal Inference," *Political Analysis*, Vol. 15, 2007, pp. 199–236.

Hosek, James R., Beth J. Asch, C. Christine Fair, Craig Martin, and Michael Mattock, *Married to the Military: The Employment and Earnings of Military Wives Compared with Those of Civilian Wives*, Santa Monica, Calif.: RAND Corporation, MR-1565-OSD, 2002. As of September 15, 2009:
http://www.rand.org/pubs/monograph_reports/MR1565/

Imai, Kosuke, Gary King, and Elizabeth A. Stuart, "Misunderstandings Among Experimentalists and Observationalists About Causal Inference,'' *Journal of the Royal Statistical Society*, Series A (Statistics in Society), Vol. 171, No. 2, 2008, pp. 481–502.

Kang, Joseph D., and Joseph L. Schafer, "Demystifying Double Robustness," *Statistical Science*, Vol. 22, No. 4, 2007, pp. 523–539.

King, Gary, and Langche Zeng, "The Dangers of Extreme Counterfactuals," *Political Analysis*, Vol. 14, No. 2, pp. 2006, 131–159.

Lim, N., and D. Golinelli, *Monitoring Employment Conditions of Military Spouses*, Santa Monica, Calif.: RAND Corporation, TR-324-OSD, 2006. As of September 15, 2009: http://www.rand.org/pubs/technical_reports/TR324/

Lim, N., D. Golinelli, and M. Cho, *"Working Around the Military" Revisited: Spouse Employment in the 2000 Census Data*, Santa Monica, Calif.: RAND Corporation, MG-566-OSD, 2007. As of September 16, 2009: http://www.rand.org/pubs/monographs/MG566/

Little, R. D. and J. J. Hisnanick, "The Earnings of Tied-Migrant Military Husbands," *Armed Forces and Society*, Vol. 33, No. 4, 2007, pp. 547–570.

McCaffrey, D. F., G. Ridgeway, and A. R. Morral, "Propensity Score Estimation with Boosted Regression for Evaluating Causal Effects in Observational Studies," *Psychological Methods*, Vol. 9, No. 4, 2004, pp. 403–425.

Payne, D. M., J. T. Warner, and R. D. Little, "Tied Migration and Returns to Human Capital: The Case of Military Wives," *Social Science Quarterly*, Vol. 73, No. 2, 1992, pp. 324–339.

Ridgeway, G., "Assessing the Effect of Race Bias in Post-Traffic Stop Outcomes Using Propensity Scores," *Journal of Quantitative Criminology*, Vol. 22, No. 1, 2006, pp. 1–29.

Ridgeway, G. and D. F. McCaffrey, "Comment: Demystifying Double Robustness: A Comparison of Alternative Strategies for Estimating a Population Mean from Incomplete Data," *Statistical Science*, Vol. 22, No. 4, 2007, pp. 540–543.

Rosenbaum, Paul R., and Donald B. Rubin, "The Central Role of the Propensity Score in Observational Studies for Causal Effects," *Biometrika*, Vol. 70, No. 1, 1983, pp. 41–55.

Schwartz, J. B., L. L. Wood, and J. D. Griffith, "The Impact of Military Life on Spouse Labor Force Outcomes," *Armed Forces and Society*, Vol. 17, No. 3, 1991, pp. 385–406.

U.S. Department of Defense, *A New Social Compact: A Reciprocal Partnership Between the Department of Defense, Service Members, and Families*, 2002.

Wardynski, Casey, *Military Compensation in the Age of Two-Income Households: Adding Spouses' Earnings to the Compensation Policy Mix*, Santa Monica, Calif.: RAND Corporation, RGSD-154, 2000. As of September 18, 2009: http://www.rand.org/pubs/rgs_dissertations/RGSD154/